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DISEASES OF THE KIDNEYS AND URINARY ORGANS

VOL. II

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VOL. II

TEXT-BOOK

OF

DISEASES OF THE KIDNEYS

AND GENITO-URINARY ORGANS

BY

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DISEASES OF THE KIDNEYS.

PYELITIS AND PYELONEPHRITIS.

An intact papillary portion of the pyramids is so seldom met with in cases of phlegmasiæ of the mucous membrane of the renal pelvis, that one is justified in uniting the two titles. Nevertheless, the anatomy and symptomatology will show us, when pyelonephritis has not yet produced extensive pyonecrotic inflammations, why we must use the term "pyelitis."

Etiology and Pathogenesis.—Although this affection is not confined to any particular time of life, still, it shows a certain predilection for middle age and for males. This affection is much more frequently met with as a consequence of local processes than as the result of general maladies. Inflammation of the pelvis is usually due to the *formation of concretions* (pyelitis calculosa), and it is necessary to devote a special chapter to a description of them. Next to nephrolithiasis, the most important etiological fact is the ammoniacal decomposition of urine, when it results from vesical stasis.

The obstacles to evacuation are very numerous, the principal ones being, according to *Dickinson's* statistics, hypertrophy of the prostate and stricture of the ureter. According to *Goodhart*, about half of those who suffer from lesions producing an obstacle to the emission of urine die of pyelonephritis. Post mortem this lesion is found in 41 per cent. of patients suffering from urethral stricture, and in 74 per cent. of those who suffer from hypertrophy of the prostate. To these two pathological causes paralysis of the bladder, of spinal or cerebral origin, must be added (see "Etiology of Cystitis and Paralysis of the Bladder"), as well as vesical calculus—both when operated upon and when not—growth in the bladder, excessive phimosis, etc.

The greater frequency of this affection in middle-aged men is not surprising. The majority of such patients have been frequently catheterized. There is scarcely any doubt that cases of spontaneous ammoniacal decomposition of the urine are rare as compared with those due to the introduction into the bladder of

fermenting agents by means of some instrument not rendered thoroughly aseptic. The fact of the artificial introduction of the causes of fermentation was first emphasized by *Traube*, and will be more thoroughly entered into in the chapter on "Catarrh of the Bladder." Our present knowledge is not sufficient to allow of our determining exactly the share in the causation of inflammation of the mucous membrane due to chemical irritation by ammonia, and that due to the micro-organisms causing ammoniacal fermentation, together with the products of their metabolism (see "Vesical Catarrh"). One thing is certain—that the development of pyelitis is in no way dependent on urinary fermentation; it has been pretty frequently observed as a consequence of the simple propagation of inflammation by continuity of tissue without any retention of urine.

Klebs' discoveries explain to us the etiology of some of these ascending forms. Bacteria, which cause inflammation, enter the tubuli uriniferi from the bladder in a reverse direction to the stream of urine, and there give rise to secondary pyelonephritis. According to *Steven*, such bacteria are also met with in the lymphatic vessels.

In regard to this, all forms of cystitis must be taken into consideration, but principally those arising from gonorrhœa. The latter account for 18 per cent. of the cases of pyelitis, according to *Finger's* statistics. Pyelitis may, however, equally arise from the kidney and the surrounding parts; thus, it may follow suppurative nephritis or paranephritis, whilst diffuse nephritis is only occasionally accompanied by quite slight forms of pyelitis.

Pregnancy; Perivesical Operations.—The relative frequency with which pyelitis comes under observation during pregnancy and lying-in, and after gynæcological operations in the vicinity of the bladder, is well-known. Some of these cases are rightly thought to be due to retention of urine from compression of the ureters by the uterus, or by other enlarged pelvic organs (*Kaltenbach, Stadfeldt*); others to the propagation of either puerperal or traumatic inflammatory processes; some even result from the rupture of abscesses into the bladder. Nevertheless, not a small number are apparently idiopathic respecting their origin. Relapses have even been observed coinciding with repeated pregnancies. Pyelitis as a partial manifestation of puerperal fever belongs to the next, not to this, group.

Infectious Maladies.—From a clinical standpoint, latent pyelitis occurring as one of the symptoms of severe acute infective diseases is of variable lesser importance than the preceding forms. These acute infective diseases often and easily enough produce croupous and diphtheritic inflammation of the mucous membranes. From the long diversified series of these infective diseases, we would especially mention cholera, typhus, scarlet fever, diphtheria in its worst forms, and hæmorrhagic small-pox.

The latter plainly manifests its localization in the renal pelvis by the hæmorrhagic form of pyelitis, like other conditions of disintegration of the blood, such as pernicious anæmia and scurvy. To these may be added puerperal fever, pyæmia, and septicæmia, whilst the etiological position of those forms which have been observed in the course of diabetes mellitus and the acute gastro-enteritis of sucklings (*Hüttenbreuner*, *Ritter*), must remain entirely doubtful.

Intoxications.—For the sake of completeness, we may mention that poisoning with cantharides, balsams, and other similar powerful substances, which we have already mentioned in the etiology of acute diffuse nephritis, may occasionally affect the renal pelvis, usually in the form of temporary croupous inflammation, after primarily attacking the bladder. Together with renal calculi, other foreign bodies, such as hydatids, eggs of distoma, pig-bristles (*Steven*), or blood-clots, may form the starting-point of pyelitis. The latter play an important part in the pyelitis of old people, according to *Ollivier* and *Dickinson*, the blood-clots resulting from hæmorrhages which have occurred from arterio-sclerotic vessels. Nevertheless, we are not prepared to entirely deny the possibility of the presence of pathogenic micro-parasites in these cases.

Finally, as etiological factors, new growths have to be considered; the chief of these are tubercle and cancer.

Traumatic Lesions.—If we add to the foregoing list direct traumatic lesions (*Fischl* has recently again emphasized the etiological *rôle* of these), the sum of the known causes of pyelitis is not yet reached. A considerable number of cases we must for the time regard as primary, or as due to "cold" (*le Dentu*, *Roberts*). *Fischl* lays great stress on the significance of cold and damp in the causation of his rheumatic forms of pyelitis. The experienced *Robin* suspects that even in his primary forms former concretions have played their part. In our experience, cases arising from unknown injurious influences are of the greatest rarity. Often, when such were diagnosed, an old latent gleet, already forgotten, could be recognised from the presence of filaments in the urinary sediment. This does not prevent us from agreeing with *Fischl's* opinion that the existence of pyelitis is often not recognised, the testing of urine being omitted or badly made; and one frequently attributes the symptoms of pyelitis to muscular rheumatism, gastralgia, etc.

Pathological Anatomy.—The disease attacks one kidney more frequently than both. One observes bilateral pyelitis ensuing from urinary stasis in the bladder; one generally distinguishes an acute and a chronic form—catarrhal, croupal, or diphtheritic pyelitis.

The chief signs of the acute catarrhal form are hyperæmia and swelling of the mucous membrane, increased epithelial

desquamation, production of mucus and pus, to which may be added, according to the principle above expressed, minute petechiæ or extended extravasations (pyelitis hæmorrhagica). In the more chronic forms, we meet with thickening of the mucous membrane, which is of a brownish-red or grayish colour; the surface is, moreover, granular (pyelitis granulosa, nodosa, follicularis). The granules are formed by gray nodular deposits of lymph-adenoid tissue in the mucous membrane and submucous tissue.

In these chronic forms polypoid vegetations are sometimes met with, and, moreover, we have noticed a deep red coloration—that is, a more intense hyperæmia—than that met with in acute cases.

It is quite exceptional to meet with ulceration in simple catarrh. The surface of the mucous membrane is covered with a variable amount of mucous and muco-purulent secretion. In this secretion no definite, specific micro-organisms can be recognised microscopically, but we have usually found a great variety of different cocci and bacilli, and at times long threads. In "croupous" pyelitis, the fibrinous exudation is of the most variable form and extent; there is usually no real ulceration of the mucous membrane.

How far the diphtheritic correspond with the croupous forms it is hard to say; the former are frequently met with in the course of pyæmic and septicæmic processes, and under the influence of ammoniacal decomposition of the urine following retention.

In both forms we find discoloured false membranes firmly adherent; these are sometimes encrusted with phosphates, and occur together with necrosis of the mucous membrane. The confusion between diphtheria and necrotic inflammation of the mucous membrane, which *Birch-Hirschfeld* has especially denounced, is easily to be understood.

Under the influence of obstructed flow of the urine, dilatation of the renal pelvis and calices occurs; when the obstruction is long continued, atrophy of the parenchyma from pressure becomes very noticeable: this may lead to the formation of real saccular kidneys (*Küster*). The various forms of obstruction to the flow of urine will be discussed under "Hydronephrosis."

The pelvis and calices being dilated, decomposition of the urine and abundant discharge of pus lead to the formation of a pyonephrosis. This is formed of large sacs, which on section appear arranged in the shape of a fan. The sacs are filled with fœtid pus—rendered slimy by ammonia—chalky pulp and old blood extravasations. The walls of the sacs are stiff and inflexible, rough inside from the copious deposits of urate of ammonia, phosphate of calcium, and triple phosphate of ammonium and magnesium. There are, as a rule, also deep ulcerations to be found.

We shall treat on the changes brought about in the projecting parts of the pyramids under compression in the chapter on "Hydronephrosis."

We have thrice seen, together with the flattening, a peculiar ring-like necrotic destruction of the papillæ. This was accompanied by constriction, and even setting free of the papillæ.

For rupture into neighbouring parts, and the possible simultaneous discovery of concretions, see the chapter on "Nephrolithiasis."

Ureter.—It is not rare to find similar changes in the bladder, whilst the ureter between them appears intact. On the other hand, all the signs of acute or chronic inflammation may be found in the ureter, such as dilatation, necrosis of the mucous membrane, etc. *Hallé* has lately shown, by means of very careful investigations, that in by far the greater majority of cases the process may be described as a uretero-pyelitis ascendens. This is distinguished by numerous dilatations of the ureter, often in the form of a rosary; between the dilatations are valvular strictures, or indurated and cicatricial narrowing of the lumen.

Finally, the frequent formation of cysts accompanying chronic inflammation has been either regarded as due to the retention of catarrhal secretion (*Litten*) or else due to softening processes, such as fatty degeneration, in the tissues of the mucous membrane, which are infiltrated with round cells (*Ebstein*).

Kidney.—In moderate recent pyelitis, the change in the kidney itself is not very characteristic. This is mostly limited to hyperæmia of the whole organ, especially of the papillæ. Its section appears dull and succulent from the tissues being infiltrated by fluid, containing epithelium, pus corpuscles, bacteria, and also hyaline casts.

Fully-developed pyelonephritis is quite different from the simple catarrhal form. This is usually met with in severe protracted cases of pyelitis. In such cases we find long tracts of necrotic inflamed tissue, running in the course of the straight tubuli uriniferi; the inflamed areas decrease in extent towards the summits of the pyramids, and are surrounded by a hyperæmic zone. Yellow streaks often extend as far as the surface of the kidney, which then appears spotted with yellow, whilst the surface of the section appears streaked with the same colour. The cortex may, however, be alone affected, the pyramids remaining free. *Bazy* has recently proved this in a series of cases.

In explanation of the fact that the surface of the kidney is more commonly affected, *Steven* has lately suggested the probability of bacteria being transported along the lymphatic tracts, while *Ludwig* and others have shown connection of the lymphatic vessels of the ureter with those between the capsule and the parenchyma of the kidney.

In contradistinction to the origin of metastatic renal abscesses,

microscopically it is proved that the starting-points of suppurating foci are collections of micro-organisms inside the tubuli uriniferi. These tubules are lined with more or less necrosed epithelium. The suppurating centres are started, as we have already said, by schizomycetes which have penetrated the collecting tubules from the renal pelvis, and there formed colonies.

This is *Virchow's* canalicular parasitic nephritis (we have already spoken of the embolic vascular form), the "pyelonephritis parasitica" of *Klebs;* the close connection of this form with the artificial introduction of pyogenic virus on infected instruments, especially catheters, has been already recognised by *Traube.*

When the different suppurating centres enlarge and coalesce, diffuse suppurative nephritis results—a type we have already described. In extreme cases the kidney is like a sponge saturated with pus, or a large sac of pus. This may again undergo further characteristic changes by the incrustation of its walls with urinary salts, continuous decomposition of its contents, formation of fatty detritus containing much cholestearin and by manifold processes of shrinking, and by the formation of tracts of new tissue.

Frequently we find large renal abscesses separated from the pyonephrosis proper by septa of parenchyma, these septa being often permeated by purulent tracts.

When the disease is unilateral, it sometimes ends favourably; we then find the pelvis and calices contracted to a thick callous capsule, the ureter obliterated, and a so complete destruction of the kidney, that we only find a small remnant of the organ embedded in fibrous tissue. In such cases we find compensatory hypertrophy of the healthy kidney, similar to that found in extensive atrophy of one kidney from various causes, or in cases where one kidney is absent congenitally or from nephrectomy.

For anatomical details of this interesting compensation for the absence of the function of one kidney, we must refer the reader to the text-books of pathological anatomy, and content ourselves with the remark that it is now definitely proved, partly by experiments (extirpation of one kidney in growing animals), that a true hypertrophy does really occur, the glomeruli, the epithelium of the canaliculi, especially of those in the cortex, become enlarged, whilst it is not yet sufficiently agreed as to whether there is any increase in the number of the glomeruli or not (*Rosenstein, Perl, Grawitz, Israel, Ribbert, Leichtenstern, Boström, Eckard, Tuffier, Lorenz* and others).

Besides these favourable consequences, we have complications following perforations in various directions; these are due to deep ulcerations of the mucous membrane with gangrenous inflammation of the surrounding connective tissue; then follow gravitation abscesses and all those other conditions described in a previous chapter (see also "Paranephritis").

In a certain number of cases, chronic pyelitis, in the form of

renal catarrh, leads to a chronic, non-suppurative, diffuse nephritis, with that decided tendency to shrinking which we have seen to accompany the suppurative forms. In pure forms of this class, which in our own experience are not so very common, pyogenic bacteria are evidently not contained in the products of inflammation.

SYMPTOMATOLOGY.—The diphtheritic form occurring during the course of the above-named severe general diseases is not noticed among other very grave symptoms, and it is difficult to give a definite diagnosis of it. Such is also the case in croupous inflammation of the renal pelvis. The presence of the latter was betrayed in the case of a patient in Jena suffering from typhoid by the passage of a round cast, covered with epithelium, as thick as a small pencil, and 15 centimetres long; at the end was an enlargement, evidently corresponding to the commencement of the pelvis. We had a similar case also in a typhoid patient here in Berlin.

For the important question of calculous pyelitis, see the chapter on the subject.

Composition of Urine.—In the first rank of objective symptoms comes the composition of the urine. Small as its significance may have been in the diagnosis of uncomplicated forms of suppurative nephritis, some of the changes in its normal character shown in these cases are of great importance. The first thing that strikes one in chronic catarrhal pyelitis is frequently the great increase in the amount of urine; this may reach to double the normal, but is in no wise constant. This increase may be in part due to concomitant hypertrophy of the heart, a sequela of complicating contraction of the kidneys. It is nevertheless found when the circulatory apparatus is quite intact, an observation in which we are bound to agree with *Fischl*. A definite explanation of this increase is therefore still wanting. To help in this explanation, *Oppolzer* supposes a collateral hyperæmia of the vasa afferentia, whilst *Ribbert's* experiments have recently supported the idea of some interference in the resorption of urinary water by the cortex, owing to its diseased condition. The greater the amount of urine, the lighter its colour naturally becomes, and the less its specific gravity.

Pus.—Provided there is no marked obstruction to its flow, the urine always contains the essential product of catarrh of the mucous membrane, *i.e.*, pus. In the simple form, early in its course, this is only found in a small quantity; later on it forms a more considerable sediment. This sediment usually contains a small amount of mucus, especially at the commencement of the disease, and also variable admixtures of blood. The latter may possibly mask a small sediment of pus, even in non-calculous cases.

Pus is never so abundant as to neutralize the acid reaction of the urine; when the reaction becomes alkaline, and is not due to

the passage of fixed alkalies, it is always produced by the well-known ammoniacal fermentation.

In such cases the urine has a disagreeable odour and deposits a plentiful gelatinous sediment. This sediment is not formed, as so many writers say, by mucus, but is pus metamorphosed by ammonia. Its morphotic elements are scarcely recognisable, in consequence of swelling, opacity, and disintegration.

Albumin.—When filtered, the urine naturally contains albumin, owing to the presence of pus. Several authors have, however, asserted that the amount of albumin is greater than that resulting from pyuria alone, for to the latter must be added that resulting from renal albuminuria, the neighbouring papillary portions of the kidneys being inflamed, also excreting albumin.

Ultzmann states that the estimation of the amount of albumin due to each of the two above-mentioned causes offers no difficulty to experienced practitioners. Our unprejudiced experience compels us to recommend the greatest caution in this matter. In a recent case of uncomplicated cystitis, the large amount of albumin contrasting strongly with the small amount of pus was very striking. On the other hand, in a case of gonorrhœal pyelitis we were much surprised with the slight degree of clouding produced by the albumin. We met with two quite similar cases recently, in which, although the contradictions were not so marked, the facts were proved by post-mortem examinations, death having occurred in each case from intercurrent disease.

Although *Ultzmann* and *Fischl* both emphasize the fact, and although the latter has observed it without exception during the first days, in only a very limited number of cases of definite or probable pyelitis were we able to estimate the relative amount of albumin due to the above two causes. It would be nearer the truth to say that, as a rule, pyelonephritis is distinguished from uncomplicated pyelitis by the higher percentage of albumin in the urine. But even in distinguishing the former from the latter, the discovery of casts would have far greater weight.

Finger asserts that the relative greater amount of albumin, both in pyelitis from gleet and in gonorrhœal cystitis, is due to violent strangury, and that when the latter is relieved the amount of albumin corresponds with the amount of pus present. We are also not able to entirely confirm this statement.

Bacteria; Epithelial Cells.—In addition to pus elements, the microscope reveals in recently-passed urine numerous bacteria (cocci, bacilli, sometimes threads—these latter, discovered by us years ago, have acquired great importance through *Albarrans* and *Hallé's* recent bacteriological researches).

Characteristic forms of epithelium from the renal pelvis, with an arrangement like the tiles of a roof, said to be pathognomonic, are still often described without any justification, as *Ultzmann*, *Ebstein*, *Bizzozero*, *Fischl*, and *Coe* have shown.

We can thoroughly agree with these authors from our own fairly large experience, in spite of *Rosenstein*, who still speaks of "very positive aids to diagnosis." Apart from the frequent absence of cells arranged in such a manner, we must warn against any conclusions as to their place of origin in the absence of any definite distinctions between the flat transitional and cylindrical epithelium belonging respectively to the renal pelvis, ureter or bladder, or even to the male urethra.

We freely admit, with *Rosenstein*, the more frequent occurrence of longish, tailed cells with one or more nuclei, arising from the

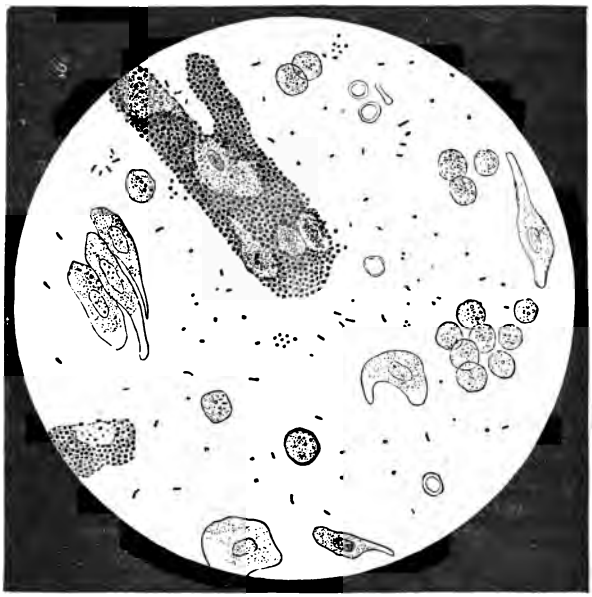

FIG. 1.—URINARY SEDIMENT IN PYELONEPHRITIS PARASITICA.

deeper epithelial layers; but their origin from the site to which this author attributes them we must declare doubtful. In short, epithelium from the renal pelvis has no importance whatever for the practitioner, in examining micro-urinary sediment, either as a constant or characteristic sign of pyelitis.

A similar decision must, we fear, be given in the case of the epithelium of the collecting tubules, again brought into prominence by *Fischl*. The differential signs from epithelium of other sections of the urinary tract, given by him, are so minute that we have never ventured to value such structures diagnostically.

The fact that leucocytes, when treated with acetic acid, show

almost always a triple nucleus prevents, in our opinion, any confusion between them and epithelial cells.

It is quite a different matter when the epithelial cells form real hollow casts of the collecting tubules, and betray their origin by the measurement of their diameter. To this measurement we attribute the most importance. Such casts are, as *Fischl* says, of the greatest significance. But we must insist on the fact that we have only met with these purely desquamative forms quite exceptionally, but all the more frequently with those having casts of the collecting tubules in the form of solid cylinders thickly impregnated with cocci—"cocci casts"—the diagnostic importance of which *Klebs* has already emphasized.

We have almost as frequently met with structures, in the form of casts, composed principally of chains of bacilli and threads running in and out in all directions. Their origin is clear after what has been said above as to bacilli being found in the tubules post mortem.

One word in conclusion on the presence of so-called prostatic thread in the urinary sediment, cylindrical in form, and composed of pus corpuscles. The presence of such was thought to be important in differentiating inflammation of the various parts of the urinary tract, since they were regarded as casts of the ductus papillares, the latter being affected with catarrh (*Dittel, Fischl*).

We cannot agree that anyone is in a position to regard them as arising from the prostatic portion, for we have thoroughly convinced ourselves that such structures, to a certain degree, represent diminutive forms of the well-known gonorrhœal threads, which we have treated of under "casts," and that they may be formed when the catarrhal process is localized anywhere in the urinary tract, from the urethra to the renal cortex. They may serve as confirmatory, but to found a diagnosis on their presence alone is a very dubious proceeding. We should naturally expect in urine ammoniacally decomposed to find quantities of triple phosphate crystals, balls of urate of ammonia and amorphous phosphate of calcium.

For details on the special character of these precipitates, we must refer our readers to the manuals on the analysis of urine. Whitish particles encrusted with triple phosphates or permeated masses with chalky débris may be often observed with the naked eye.

A more or less sudden cessation of pyuria is of great significance. This may indicate an obstruction of the flow of urine from closure of the ureter, provided, of course, the affection is unilateral. We shall deal more fully with such obstructions in the sections on "Nephrolithiasis" and "Hydronephrosis."

Under such circumstances the diseased organ swells, whilst the healthy one secretes a clear and essentially normal urine. This swelling gives rise to violent pains, especially an increasingly

painful feeling of tension, rigor and vomiting. Should the passage become free again, the severe symptoms rapidly pass off, whilst the urine again becomes clouded with pus.

This clinical picture of an intermittent pyonephrosis may be repeated again and again (*cf.* "Hydronephrosis"). It is easily understood how alarmed the patient becomes at the appearance of clear urine, knowing so well what it forbodes, and how anxiously he awaits the reappearance of the deposit of pus.

Like conditions in the behaviour of the pus may occasionally be produced by the alternate shutting off and communication of real nephritic abscesses and perinephritic collections of pus with the renal pelvis.

Complete obstruction of both ureters of course produces anuria and, as the case may be, uræmia; the same will result from unilateral obstruction, if, unfortunately, the patient be blessed with only one kidney.

General Symptoms.—So much for the conditions of the urine. As to general symptoms, the development of acute pyelitis is generally marked by fever, with rigors, and even, may be, vomiting. In some cases the patients further complain of pain in the loin, which radiates in the characteristic manner already mentioned, especially down the ureter of the affected side.

This pain, at one time moderate and bearable, at another time scarcely noticed, is not uncommonly first detected on palpation of the abdomen, more or less definitely localized. It may, however, reach such an intensity as to call to mind renal colic, especially as *Ebstein* found in the course of the idiopathic form of this disease occurring during the puerperal state.

For the pain produced by pyelitis calculosa, and its origin, see the corresponding chapters.

In very chronic cases the patient may make no complaint of pain, and there may be no tenderness on pressure, in spite of obstruction to the flow and decomposition of the urine. The above-mentioned initial rise of temperature must be entirely distinguished from the grave, more or less continuous hectic fever, interrupted by rigors, which often, but by no means always, accompanies pyelonephritic abscess, as it generally does suppurative nephritis.

Hectic fever often enough occurs with a typhoid condition, small, frequent pulse, vomiting, drowsiness. This condition is also described under various terms, such as uræmic, ammoniæmic, pyæmic, septic; but we have already dealt with it in sufficient detail.

In a case of pyelonephritis with alkaline fermentation of urine, observed by us during a long period, quiet delirium lasted for several weeks, with well-marked dropsy of the upper part of the trunk; the significance of the uroseptic symptoms was strongly suspicious of uræmia.

In another case described by *Butte*, an old man with enlargement of the prostate, and subsequent disseminated suppurative pyelonephritis, the uræmic character of a sudden amaurosis and violent dyspnœa was proved by the examination of blood removed by a cupping-glass. Such estimations of the amount of urea in the blood are of great importance in making a diagnosis, in old people especially, in whom uræmia is very liable to be overlooked, or the symptoms attributed to emphysema or senile cerebral atrophy.

Regarding the various *ruptures* of pyonephrosis, we refer our readers to what we have already said on suppurative nephritis.

Palpation of the Kidney. — Very great importance must be attached to the discovery of a tumour, on palpation, in the striation of the affected kidney. This is often found to be tender, and not rarely fluctuates if the pyonephrosis be at all extensive. It will be clear that this discovery, which we shall fully discuss under "Hydronephrosis," has quite an entirely pathognomonic value when it coincides with the cessation of a previously observed pyuria, and the grave general condition already described.

In some cases which await more detailed description under "Hydronephrosis," it is possible to detect an increase and decrease in the size of the tumour, corresponding to the obstruction or free passage of the urine.

Gonorrhœal pyelitis calls for some special remarks—that is, the acute form, not that which is developed after strictures of the urethra which have persisted for years, and have been followed by ammoniacal decomposition of the urine.

As it has chanced, we have had under our observation quite a series of cases, one shortly after the other, of this rare complication of gonorrhœa. (*Finger* diagnosed it 12 times in 495 cases.) Some of our cases were positively diagnosed by the discovery of casts of the collecting tubules in the urine; in others, the diagnosis was rendered probable from the changes in the urine we have described. As to the symptoms, in all essentials we agree with *Zeissl's* and *Tarnowsky's* descriptions. Other symptoms were preceded by cystitis. This was followed by fever, ushered in by rigors and violent pain in one loin, together with tenderness on pressure in the same lumbar region. An acute course, reckoned by days (in distinction from the "idiopathic" form, which through relapses always tends to chronicity), was common to all cases. In one of our cases there was in addition violent vomiting and intense headache.

Twice we observed the disappearance of pyuria and the pains simultaneously, so that the pyelitis, cystitis, and urethritis were recovered from at the same time. In yet another case, pyelitis developed immediately the patient left his bed, after previously remaining there constantly, and although it lasted but a week, it was accompanied by well-marked polyuria.

The observations of *Vidal*, *Rosenstein*, and *Murchison* all prove that pyelonephritis may suddenly arise during the course of acute gonorrhœa. Perhaps we should mention here *Bockhart's* case of artificial infection by pure culture of gonococcus. When ascending nephritis, without suppuration, but with consecutive atrophy, follows catarrhal pyelitis, the symptoms may closely resemble those of granular contracted kidney.

DIAGNOSIS.—After the references to diagnosis in the preceding section, the great difficulty there is in recognising this disease will be plainly evident, and it only remains for us to draw attention to the great danger there is of confusing pyelitis with cystitis.

Although the former theory that the urine is ammoniacal in cystitis and acid in pyelitis has been quite abandoned, there is, nevertheless, a greater tendency to alkaline fermentation of the urine in cystitis.

We have previously drawn attention to the difficulty there is of proving the presence of epithelium from the renal pelvis in the urine, and the doubt as to the value of a larger proportion of albumin than that due to the pus.

Polyuria has a certain importance, but is by no means pathognomonic. Pain is only of value in the diagnosis when definitely localized in the region of one of the kidneys; the radiations are too indefinite to be of any great help.

The presence of casts of the collecting and straight tubules, and especially of those casts composed of cocci we have figured and described, points to the pelvis and kidney as the place of origin of some at least of the pus.

The absence of catarrh of the bladder, so much insisted on by *Ebstein*, is of great value; but even in uncomplicated pyelitis we must not forget the possibility of the pain radiating towards the vesical region, and simulating a disease of the bladder (*Rosenstein*).

When, as so often happens, pyelitis is complicated with cystitis, a careful consideration of the chronological order of the symptoms may be of great assistance in the very difficult diagnosis, but in a considerable number of such cases it will be impossible to get nearer than a supposition. Our more recent unbiassed experience of cases watched for a long time has only strengthened this conviction.

Coe has quite recently again rightly insisted on the difficulty of a definite diagnosis in cases of inflammation of the renal pelvis when cystitis is also present. Pyelitis, like pyelo-nephritis, often runs quite a latent course, and the presence of one or two symptoms, or even a combination, often regarded as characteristic, is not sufficient. This observer has succeeded in a case of vesico-vaginal fistula in directly comparing the fluid from the inflamed bladder with that from the similarly inflamed renal pelvis. He could not, however, discover any marked difference

between them, a fact thoroughly justifying a sceptical attitude. *Coe* also attributes some value in favour of a diagnosis of pyelitis to the presence of a thick deposit of pus, without the admixture of much mucus. In our opinion, he attaches too much importance to the discovery of renal epithelium in the urine. As to the presence of much mucus, stress can only be laid on the point in cases without any ammoniacal fermentation of the urine.

After what has just been said, we are not very enthusiastic regarding the diagnostic results of repeated irrigation of the bladder in cases of pyelonephritis and cystitis—in fact, the difference of composition of the various portions of urine is of very little importance. If pressure on the loin causes a decided increase of pus in the urine contained in the bladder, only one interpretation can be given—it is plain that pyelonephritic fluid has been forced from the kidney through the ureter. So far, however, we have not been in a position to attach much value to this manipulation, owing to want of cases in which it could be made use of. Such cases seem by no means common. The differential diagnosis of renal tumours will be treated of later under "Paranephritis" and "Hydronephrosis." In those cases, where one cannot perceive the characteristics belonging to a tender, fluctuating tumour, even when an exploratory puncture yields pus, one must be careful to avoid confusion with perinephritis, psoas-abscesses, and even with hydatid of the liver. Pyelitis and pyelonephritis ensuing from general serious diseases usually escape diagnosis.

Prognosis.—We shall discuss diagnosis and prognosis of pyelitis calculosa together with nephrolithiasis; as for the rest, the primary disease and its complications are, as a rule, the most important points in forming a prognosis. We have nothing to add as to their significance to what has been said under symptoms. A good prognosis may usually be given in cases of pyelitis during gonorrhœa, confinement (except, of course, pyæmic puerperal cases), and convalescence from typhoid, as long as it is simply of a catarrhal nature. Primary "idiopathic" forms, or those due to "cold," are less favourable than the preceding, owing to their great liability to relapses and strong tendency to become chronic.

The dangers of fully-developed pyelonephritis and pyonephritis, such as hectic fever, septic uræmia, etc., need no explanation; they have been very essentially diminished by rational surgical interference.

Well-marked double-sided pyelonephritis, following obstruction to the flow of urine and its ammoniacal decomposition, ends fatally within a few weeks in the majority of cases; more rarely they linger on for a year, and still more rarely they recover.

We have already spoken of the influence perforations into neighbouring parts have on the prognosis. The serious nature of

the obstruction of both ureters is evident; unilateral obstruction has also its dangers, amongst which we must not only reckon the development of pyonephrosis and threatened perforation, but also the very dangerous reflex action on the other kidney. We saw one patient die with anuria and uræmia, in whom the post-mortem revealed unilateral pyelitis, without distinct closure of the ureter; all the structures on the other side were quite normal. We have seen, with *Fischl*, pyonephrosis completely cured after a highly febrile course of some weeks' duration without any artificial help, after the obstruction had been repeatedly resolved and reconstructed. The obstruction of the ureter in this case was unilateral, of quite unknown origin, but certainly not due to calculus.

TREATMENT.—The treatment of pyelitis as a catarrh of the urinary tract we shall deal with under "Cystitis"; whereas for the treatment of pyelonephritis and pyonephrosis, with extensive suppuration of kidney, the reader is referred to the chapters on "Suppurative Nephritis," "Stone in the Kidney," and "Hydronephrosis."

PERINEPHRITIS AND PARANEPHRITIS.

In practice it is impossible to separate these two affections. The chronic inflammatory thickening of the renal capsule, especially that connected with the various forms of nephritis, and which some authors call perinephritis, in a restricted sense is of no clinical importance. In this place we need only consider the inflammations with a tendency to suppuration of the cellular fatty tissues which surround the kidney. These only deserve to be looked upon as well-established and characteristic morbid processes. For the sake of brevity, we shall employ the term "paranephritis," which seems to be daily coming into greater use. The condition is rare. The cases collected by *Rosenberger*, *Nieden*, *Fischer*, and *Fenwick* only amount to about a few hundred.

As far as we are concerned, we have only seen this disease existing as an independent affection in four cases, and have met with it as a secondary lesion in the cadaver about twice as often.*

ETIOLOGY AND PATHOGENESIS.—Following *Fischer*, we distinguish a primary and a secondary form. The condition is, with

* Numerous personal observations led *Tuffier* to distinguish three forms of the *tuberculous processes* associated with *perinephritis:* the hypertrophic form (fibro-adipose), fungus form, and purulent form (cold abscess).

Tuffier observed two cases of the first form; in one of the same the enormously enlarged (three times the original size) and hard adipose capsule (apparently free from tubercles) surrounded the tuberculous kidney, and remained after extirpation of the latter as renal tumour. He also observed the very rare fungus form develop itself in one case, after incision of the kidney suffering from tubercular pyelonephritis, and after renal fistula had long existed. After opening the capsula propria of the kidney, tuberculous process in the form of manifold fungus forms spreads itself over the perirenal tissues.—W. H. G.

very few exceptions, unilateral, and has been even observed in the fœtus (*Weber*), but it is most usually seen in persons between thirty and fifty years of age (*Hallé*), and with greater frequency in men (*Nieden*).

The most usual local cause of *primary* paranephritis is traumatism, such as wounds, blows, or violent and sudden exertions, particularly of the trunk. Traumatic hæmorrhage into the tissues surrounding the kidney, even when very abundant, does not necessarily lead to suppuration. At the necropsy of a patient of ours who died several years ago from other causes, we found pararenal hæmorrhagic deposits as large as a child's head, undergoing aseptic involution.

The *general* causes are acute infectious diseases, especially puerperal fever, typhoid (*Rosenstein*), variola (*Wagner*), scarlet fever, diphtheria, pyæmia, and septicæmia; and, according to *Rosenstein*, *Elias*, *Fischer*, and *Fenwick*, chill.

The *secondary* forms are of more frequent occurrence. They are usually the result of renal suppuration, especially of calculus, pyelitis, and of pyelonephritis, with or without perforation. According to *Steven*, it is mostly the lymph passages previously alluded to which allow the passage of the infectious material. Finally, perinephritic abscesses may result from suppurative inflammatory conditions of various organs by continuity. In this connection we must consider psoas-abscess, vertebral caries, pelvic inflammations, parametritis, pericystitis, periproctitis, purulent peritonitis, and, according to our experience, retrocæcal suppuration following typhlitis, operations on the womb, the testicle (*Chopart*), the rectum (*König*), and also inflammatory infections of the duodenum, of the gall-bladder in cases of cholelithiasis (*Trousseau*, *Ebstein*), abscesses of the liver, empyema (*Lancereaux*), pulmonary cavities which have perforated the diaphragm (*Bayer*), and, finally, actinomycosis (*Fischer*).

It has been stated that neuralgic affections of the genito-urinary organs develop into paranephritis (*Trousseau*), which is about as correct as the view that paranephritis is endemic.

In not a few cases, the disease commences without *apparent cause*. Three of our primary cases belonged to this category, for we hesitate to consider chill as an etiological factor.

Pathological Anatomy.—In paranephritis a genuine circumscribed abscess is generally found, which may contain large quantities of pus. In the majority of cases, besides pus, fragments of necrosed cellular tissue, of fat, and of blood, are also present. Gangrenous, septic, ichorous phlegmons are rarer. We have, however, met with them in a case of idiopathic pararenal suppuration, without the kidney being affected.

The partially destroyed cellular tissue is discoloured, and its meshes contain pus. In consequence of the destruction of the fatty capsule, the kidney may become mobile, and float in the

abscess. The pus gradually burrows into adjacent structures, and this is characteristic. Most frequently the morbid process extends to the retro-peritoneal cellular tissue in the direction of least resistance, involving the region between the diaphragm and the iliac fossa at the lower end of the quadratus lumborum, this muscle being as liable as the ilio-psoas to become involved by ulcerative processes.

When cellulitis spreads from the pelvis, it follows, according to its situation, the direction of the round ligaments, the broad ligaments, the inguinal canal, or the spermatic cord. In one case observed by us, ascending suppuration of the cellular tissue round the spermatic cord produced perinephritis, leading to fatal peritonitis.

Perinephritic abscesses point most usually in the lumbar region. Perforation into the colon, after the formation of adhesions, is scarcely less frequent (*Duffin, Nieden*); and although the pus has a fæcal odour, the intestinal contents do not generally find their way into the abscess cavity (*Feron*). The urinary tract may become affected in a similar way. Perforation through the diaphragm into the pleural cavity and the bronchi (causing empyema and pneumonia), into the small intestines, the peritoneal cavity, the pericardium or the vagina, is less frequently observed. Finally, abscesses may exist, which, taking a downward course along the psoas and under *Poupart's* ligament (*König*), find their way into the iliac fossa, and point in the perinæum and scrotum.

When the disease is prolonged, and improvement sets in, fibrous encapsulation and cicatricial thickening of the surrounding tissue are frequently met with. Finally, the kidneys may be affected, and become the seat of diffuse and suppurative inflammation, followed by atrophy, or even necrosis.

Symptoms.—The secondary forms produced by serious general diseases, especially those connected with puerperal fever, for the most part escape clinical observation; those which accompany calculous pyelitis may even be completely masked by the symptoms of the original illness.

The case is different with primary perinephritis, which usually presents a train of characteristic symptoms, chief among which are *pain, fever, swelling*.

Pain, which sometimes appears immediately (traumatism), is usually localized to the lumbar and abdominal regions. In rare instances it may be bilateral, and, as we ourselves have observed, the patient may complain of pain on the sound side. The pain is sometimes bearable, sometimes acute; it may be continuous, remittent, or intermittent, and sometimes even tertian in character (*Elias*). It radiates frequently towards the lower region, and is never quite absent when the disease lasts for some time. The pain is increased by firm pressure, and by active and passive movements of the body. The patients walk in a gingerly

manner, are afraid to cough and sneeze, are careful of straining, and lean towards the affected side (*Hagen*). In a case observed by us, we noticed an exquisite sensibility of the lumbar region, and paroxysms of pain on palpation.

Fever frequently commences with rigor, at other times it begins quite gradually; later it takes a hectic form, and is interrupted by frequent rigor. Severe dyspeptic symptoms are nearly always observed, and obstinate constipation, which can only be explained in part by pressure of the tumour on the colon. In one of our own cases, the chief symptom was marked frequency of respiration, due to interference with the movements of the diaphragm.

The *swelling* can usually only be felt after the illness has lasted for some weeks; up till then, especially when the pains are moderate, the condition may be mistaken by careless observers for rheumatic fever, particularly when it is accompanied by deceptive remissions. The position of the tumour usually corresponds to the seat of the pain; it may also be sought for on the outer border of the long dorsal muscles. An attentive eye may often perceive the swelling, owing to the increase in volume and width in the lumbar region.

The multiplicity of forms which the tumour assumes leads to confusion with constipation, which, however, can be cleared up by purgatives and enemata. The fact that the tumour is not affected by respiratory movements proves its independence from the liver.

The existence of *fluctuation* is of great importance. At the end of some days or of some weeks it is sometimes possible to make out deep fluctuation. The importance of simultaneous erysipelas or tumefaction of the corresponding region of the skin is obvious.

The patients frequently complain of paræsthesia, neuralgia, or weakness of the thigh on the affected side, which is nearly always kept flexed.

The urine presents nothing characteristic; the absence of pus and of blood is most important, as it thus excludes pyelitis. We were struck in one of our cases by the great quantity of micro-organisms, resembling the *Bacillus anthracis*, found in freshly passed non-albuminous urine containing only a few leucocytes. This bacterium appears several weeks before the spontaneous rupture of the abscess into the renal pelvis, and it gives rise to bladder troubles.

Spontaneous rupture of the abscess occurs, as we have already said, most frequently below the false ribs, and into the colon and the urinary tract. Sudden diminution in the size of the tumour, and almost immediate disappearance of all the symptoms, are the usual, but not invariable, consequences. In cases of rupture into the intestines or the urinary tract, one naturally finds pus in the fæces or in the urine. Rupture into the urinary tract may occur a considerable time after incision of the perinephritic abscess (*Henoch*). As to the clinical course of the other perforations

already mentioned, we have nothing to add to what has been said in the chapter on renal suppuration. *Jakoby* observed perforation into the lung without any changes in the severity of the symptoms.

When the abscess is extensive, the patient mostly succumbs to exhaustion, caused by continued suppuration and hectic fever, in spite of the favourable spontaneous evacuation of the abscess contents. In other cases, a year or more is necessary to close the fistula. When the course of the affection is slow, it is frequently complicated with secondary inflammation of the serous membranes, notably with pleurisy. On the other hand, compression of the ureter may cause urinary stasis, with ammoniacal fermentation. In such a case, the patient may be carried off by septicæmia with typhoid symptoms, as already described, this termination much resembling that following perforation into the renal pelvis. *Elias* observed ascites supervene as a result of compression of the vena portæ by cicatricial tissue.

Diagnosis.—At the onset, the primary form may resemble *neuralgic affections*, *muscular rheumatism*, and *renal abscess*. The course of the fever prevents, however, confusion with the two former conditions. The presence of the three cardinal symptoms has only a doubtful value for the differential diagnosis of simple suppurative nephritis; the general course of the malady is of more importance, but a simultaneous inflammatory cutaneous œdema is pathognomonic. The state of the urine is not of great assistance, as it may contain, as we ourselves have remarked, even in primary paranephritis itself, bacteria and catarrhal products, if only in small quantity. Testing it does not help one much to distinguish paranephritis from the cystitic, pyelonephritic kidney, which may furnish, according to the degree of obliteration of the ureter, a liquid containing small or large quantities of pus, or even no trace whatever.

To make a diagnosis of secondary forms of calculous pyelitis or of other affections is even more difficult. In the presence of a fluctuating tumour, it is often impossible to establish the differentiation. We cannot too strongly recommend the examination being made under anæsthesia. Explorative punctures are of great importance and aid the diagnosis; we recommend extraperitoneal punctures in the lumbar region.

According to *Rosenstein*, *renal tumours* point especially at the anterior part of the abdomen, but the paranephritic tumours develop towards the dorsal region; we have, nevertheless, observed very distinct exceptions to this otherwise important rule.

A patient whom we attended some time ago showed all the symptoms of tumour of the kidney, which was regarded as malignant in consequence of cessation of fever, of progressive cachexia, and of the negative results obtained by repeated exploratory punctures. The ultimate course of the affection, which terminated favourably, left no doubt as to its paranephritic nature.

As soon as a firm diagnosis is made, and before the lumbar region shows redness of the skin and fluctuation is felt, the paranephritic abscess must be opened by a vertical and, of course, extraperitoneal incision (caustics are not to be used). The operation and after-treatment (antisepsis, drainage, etc.) can be found in text-books of surgery. *Duffin* recommends *early puncture* of the abscess; we cannot advise it as a curative method. When the diagnosis is uncertain, it is well to wait a little. We have seen large useless wounds become harmful to the patient, and serve no purpose as far as the physician is concerned.

Operative interference undertaken to prevent paranephritis from becoming complicated with other renal affections (lithiasis, pyonephrosis) is sometimes of surgical importance (*Fischer*).

NEPHROLITHIASIS, RENAL CALCULUS, RENAL CONCRETIONS.

Etiology and Pathogenesis.—Where conditions exist which produce the precipitation of certain urinary elements, be it in the kidney itself or in the pelvis, renal concretions *may* be formed. It has been said that urinary materials could only be precipitated when their proportion was increased in the urine. To prove the contrary, it is sufficient to draw attention to the fact that uric acid, even when in smaller proportions than normal, is precipitated as soon as the acidity of the urine increases; that phosphates are deposited when the alkaline reaction of urine does not allow them to remain in solution, so that precipitation of oxalate of calcium must take place when the free mineral acids of the urine are neutralized. The old theory of uric acid, phosphoric acid, oxalic acid diatheses, must be examined from this point of view. Organic anomalies, which by means of incomplete oxidation of the tissues give way to the increased formation of uric and oxalic acid, alterations of the functions of the nervous system, which lead to the increase in the same manner of phosphates, have since *Boerhave* been constantly considered as producing lithiasis.

On the strength of these theories and clinical and experimental researches on the subject, a great deal has been said without a certain proof of its validity. We adopt here the more recent ideas of *Dana*. This author, on the basis of his investigations, admits that certain kinds of neurasthenia, and other neuroses, gout, perhaps also rheumatism, are sometimes accompanied by an increase in the excretion of the urinary elements of which we have spoken, but he rejects the theory of lithiatic diathesis.

It is well known that *Virchow* opposed not long ago the current opinion—that the uric concretions in the renal pelvis and bladder are in proportion to the gout—in the most energetic manner; he only allows that this coincidence is very rare. We have remarked that gout only becomes dangerous for the kidneys through the

deposit of uric acid in the kidney itself, and especially in the tubuli uriniferi.

Composition of Calculi.

Renal calculi are nearly always (80 per cent. of all the cases) composed of uric acid and its salts; the latter form the gravel and nephrolithiasis. Oxalate of lime comes in the second place. Concretions formed solely by earthy phosphates are exceptional, and more so than the so-called secondary phosphatic calculus; the nucleus is formed of uric acid or of oxalate of lime, and the exterior of earthy phosphates. Abnormal urinary ingredients, such as cystin, may play the part of calculus. It is impossible to enter into details here on concretions of indican and like rarities.

Uric Acid Calculi.

The most minute and numerous researches have up to date given us but little explanation on the mode of development of urinary concretions. We know for a fact that, in the development of uric acid concretions, changes of temperature and simple increase of the concentration of urine do not play a very important part. Besides, as we mentioned before, precipitation of uric acid and urates in the urine does not permit of one forming the least idea as to the quantity of uric acid contained in the urine. The conditions of crystallization are much more likely to be found in an abnormal *acidity* of the urine, which separates this acid from alkaline combinations. For details regarding the acid fermentation of urine, the reader must refer to works on urinary analysis.

Hermann has also observed nephritic colic in a patient suffering from leucæmia, with evacuation of uric acid, gravel and calculi, and finds the rarity of this complication, with the remarkable increase of uric acid productions with leucæmia, a striking coincidence.

M. Stern finds, on reference to numerous statements of necropsies, that degeneration of the heart frequently accompanies nephrolithiasis, and considers, with *Mascha* and *Leube*, the former condition to be of etiological importance.

A considerable number of persons pass spontaneously crystals of uric acid in their fresh, warm urine, without nephrolithiasis and renal calculus being a necessary sequel.

Thus arise the two most important questions of the pathology of uric nephrolithiasis:

1. How is greater acidity of the urine produced which separates uric acid from its associations?

2. What are the conditions which determine the formation of genuine concretions out of precipitated uric acid?

We are far from being able to give a satisfactory answer to these questions; we hardly know whether the urine undergoes a kind of acid fermentation in the urinary passages, and to what extent this acidity attains.

It seems very natural to conclude from the presence of deposits of urates in the gouty kidney that an etiological connection exists between *gout* and nephrolithiasis, and to consider the latter as the consequence of an *inactive life*, with an excess of animal food. *Magendie* relates the story of a merchant who twice lost his fortune and at the same time his gravel, but the latter returned again when he had made enough money to renew his luxurious excesses. Most physicians can cite cases showing that renal lithiasis is produced by a sedentary life with too rich food. But such observations—and certainly the majority of physicians can bring many proofs that this illness is caused by too good living—do not demonstrate the connection between uric lithiasis and gout—a connection denied by *Virchow*, who bases his opinion on pathological and anatomical facts, and disagrees for the most part with the geographical distribution of the disease. This does not, however, prevent us admitting that an individual or hereditary predisposition for renal lithiasis exists, for a number of persons escape who live in exactly the same manner, and suffer from gout like those who are attacked by renal lithiasis. *Rosenstein*, who has but seldom observed lithiasis coincide with gout, regards the two groups of phenomena as an equivalent expression of an anomaly in the intra-organic circulation.

Recently, at the necropsy of an individual suffering from leucæmia, we found the pelvis of one of the kidneys filled with large uric calculi. One must not, however, conclude from this fact (already emphasized by *Virchow*) that in this constitutional disease, which in itself tends to the formation of concretions of uric acid, a sufficient basis exists for the formation of concretions.

The same may be said with regard to the influence of an excess of starchy food. Starchy food is said to increase the production of lactic acid, and to have a tendency to produce gravel (*Magendie*). *Cantani* considers milk as especially dangerous. Beer and wine are said to be so also, especially when they are fresh and not sufficiently fermented; also indigestions with plentiful formations in the stomach of abundant quantities of butyric acid, etc. All these factors aid the production of nephrolithiasis. *Rosenstein* justly remarks that the frequency of lithiasis in children, where the already-mentioned conditions only exist partially or not at all, pleads against their true pathogenic importance.

Drinking water, accused by so many authorities, has, in our opinion, nothing to do with the formation of renal calculus. Water with an abnormal quantity of chalk has a contrary effect on the precipitation of uric acid, for it decreases the acidity of the urine; and, on the other hand, the effect of the latter is much too unimportant to render the precipitation of earthy phosphates possible.

With regard to the second question, we now know, thanks to

Ultzmann's and *Krüche's* researches, that renal calculi are not simple agglomerations, but that they are formed of crystallized masses which are subject to the general crystallographic laws. What produces these crystallizations? *Assmuth*, *Ultzmann*, and *Cantani* consider the existence of specially irregular crystalline forms(Fig. 3) to result from hyperacidity of the urine. One cannot understand, however, why, such being the case, analogous concretions are not formed in other cases.

The centre of deposits, the nucleus of the concretions, most frequently consists of a *foreign body:* blood coagulum, perhaps remains of uric acid, infarcts of infants, ova, epithelial shreds, catarrhal products, especially mucus. *H. Meckel* even spoke of a *catarrhal lithiasis*, which established itself imperceptibly by a superficial secretion of a peculiar nature. *Cohnheim* judges rightly that the presence in the pelvis of hard or soft bodies does not constitute a sufficient agent for the creation of concretions, and he remarks that the renal pelvis is traversed by all sorts of corpuscular elements circulating in the blood. A very significant fact is the absence of all coarse concretion in the tolerably numerous cases where pronounced urinary stagnation exists, and in spite of the formation and excretion of abundant gravel, *Scherer* considers this fact to be of primary importance.

Be that as it may, the incessant desire to find an organic cause for petrification has given rise to very important researches recently made with good results. *Cantani* thinks that the agent of cohesion is no other than the mucus of the urinary passages. By examination of very fine segments of the calculus, *Ebstein* has succeeded in diagnosing the existence of uric acid between the various strata of a peculiar stroma composed of albuminoid matter, and has discovered in the calculous materials a fundamental difference between gravel and simple uric acid sediment of the urine. The existence of an organic stroma, in which the lithogenous elements are deposited, has been latterly confirmed by *Posner*. It is this which shows us (*Posner* particularly emphasizes this fact) that the pathological process of calculous formation obeys the same laws as the normal process of the development of the solid parts of the skeleton. After dissolution of the concretions there remains a delicate mass, probably of epithelial origin, which can be coloured by iodine and carmine. This mass is also peculiar to *Posner's* "mikrolithes," crystals which, through this combination, just deviate from the ordinary. Their presence cannot be considered as a proof of calculous disease, as *Carter* supposed, but as a sign of local petrification or lithogenesis.

Oxalate of Lime Calculi.

The genesis of the concretions of oxalate of lime calculus is even more obscure than that of uric acid calculus. We know that oxalate of lime, which is according to *Schultzen's* and our experi-

ments a normal constituent of urine, is daily introduced into our organism by various foods, or is perhaps produced by the organism, and is precipitated in the form of the well-known envelope-shaped crystals (Fig. 2), together with uric acid, as well as—a fact generally not enough insisted on—in neutral and alkaline urine. For this oxalate of lime sometimes constitutes the nucleus, sometimes the peripheral portions, of the concretions. The presence of intense oxaluria—the importance of which as a pathological symptom and as an expression of disturbance of oxidation and innervation, has been much doubted by *Ebstein*—does not co-exist

FIG. 2.—CRYSTALS OF OXALATE OF LIME.

necessarily with the production of oxalate of lime calculi. *Somma* has latterly spoken of this affection as a neurosis due to exhaustion of the sympathetic nerve; while *Ellis* incriminates certain bacteria in the ingesta, which are supposed to possess the power of transforming other organic acids into oxalic acid.

PHOSPHATIC CALCULI.

It is obvious that insufficient acidity of the urine, or its neutral or alkaline reaction, must be taken into consideration for the part which phosphates, *i.e.*, calcium phosphate, magnesium phosphate, triple phosphate (Fig. 5), play in forming concretions. It is chiefly alkaline fermentation which is the cause of the frequency

with which one meets phosphatic concretions as secondary layers, and as vesical calculi. On the other hand, primary phosphatic calculus in the renal pelvis is rare.

Cystin Calculi.

The history of the development of cystin calculi, which separate themselves from acid urine, was for us a closed book, in spite of the very minute observations on a series of cases of cystinuria (*Bartels, Ebstein, Cantani, Stadthagen, Czapek*, etc.), up to quite recent times, when further research (*Baumann, Goldmann, Brieger*) has explained the connection of cystinuria with a kind of intestinal mycosis, thus dispersing to a certain extent the clouds which surrounded this question. The production of diamines through certain bacteria, combinations in the intestines of these diamines with the normal cystin product of intra-organic transformations, passage of salt into the acid urine, and precipitation, are considered the cause. In sixty-three cases collected by *Ebstein*, he was not able to discover an organic stroma acting as a support to the fundamental material of the calculus, which, according to *Fabre*, is but seldom met with in urine.

Hartmann observes that *Udranzky* and *Baumann* have published very interesting facts regarding the nature of *cystinuria*, and they have proved that it is an infectious disease, the seat of which is in the intestines. As *Leo* has not been able in a case of cystinuria to influence the elimination of cystin by the use of albuminoid alimentation, it is probable that resorption of the peptones in the upper segments of the intestines goes hand in hand with a development of activity of the corresponding micro-organisms in the lower portions.

Experience teaches that nephrolithiasis is met with in all ages, even in the fœtus (*Woehler, Denis*), chiefly in the poorer classes. (*Thompson*). Nevertheless, if one believes *Moeller, W. Müller* did not find one single case in 300 necropsies of still-born children. Thus, in the embryo stage, the conditions for the production of lithiasis seem but seldom fulfilled. Infancy furnishes an important contingent (*Heusinger, Civiale*); the disease occurs also in ripe old age.

In 277 positive cases which he met with out of 5,013 necropsies made in the pathological institution in Jena, *Müller* found a remarkable preponderance of the affection in children of a year old and old persons of eighty. We ourselves have frequently met with genuine nephritic colic in sucklings. Perhaps part of the cases of renal lithiasis in adults is dependent on the uric acid infarctus of the newly-born (*Brücke*). But up to date this idea has remained hypothetical. According to the unanimous opinion of various authorities, the male sex is much more frequently attacked. *Moeller* declares that females are more disposed to *renal* lithiasis, males to *vesical* lithiasis.

Hereditary influence is incontestable, even when it is not a question of gout, as, for example, in cystinuria.

Lithiasis has a propensity for particular climates and countries; no region can boast of complete immunity. Some furnish a very considerable contingent; for instance, the North-West of Europe. Remarkable differences even exist in a comparatively small space. Here we find the disease endemic; there it is hardly known. The reason is unknown; probably climate exercises a considerable influence. *Rosenstein* incriminates the sudden changes of temperature and the pronounced hygrometrical state of the atmosphere. "Every district has its *faible convenue*," says *Cohnheim*. According to *Hirsch*, the geographical distribution of gout in no way coincides with that of lithiasis.

Infarction of uric acid and of bilirubin in newly-born infants, of which we have already spoken, deserves special mention. *Virchow* has made the former a subject of special investigation, and they are explained by him as the manifestation of an exaggeration of the activity of physiological intra-organic changes due to the establishment of respiration, oxidation, and digestion. Certain observers contend that this infarction is not met with in still-born infants, and thus a forensic importance must be attached to it; the fact of infarction being often found in children where it is proved that no respiration could have taken place (*Hoogeweg, H. Schwartz, Birch-Hirschfeld, Ebstein, B. Schultze*) is a sufficient contradiction of this view. As to those who incriminate incomplete combustion resulting from the imperfect oxidation of the blood, the fact that one frequently finds infarction in vigorous children who breathe freely, and that, on the contrary, it is often missing in children who have succumbed to the want of a sufficient power of respiration, to atelectasia, or to pneumonia, proves the contrary (*Cohnheim*). Uric acid infarction, which usually only attacks the minority of newly-born infants, is observed frequently from two days after birth to the end of the second week; it is uncommon in cases which end fatally directly after birth; in certain cases—a fact we can confirm from personal experience—one meets with it after the first three months.

A distinction must be made between this uric acid infarction and that of *bilirubin*, which one often finds together, and which was first described by *Neumann* as an expression of icterus neonatorum, as well as of *hæmorrhagic pigment infarction* consecutive to small extravasations.

Finally, we have seen in the kidneys *calcium precipitates*, which were for the most part, as *Virchow* has proved, directly dependent on a catarrhal process in the papillary areas and on nephritis developed in the cortical substance. We have seen part of these as a complication of mercurial nephritis, and as a consequence of ligature of the renal artery, as shown by *Litten*. This author has proved that calcium salts can incrust the renal epithelium from

the capsule to the papillary apex, where they are maintained by certain cellular changes, especially by coagulative necrosis, associated with the corresponding reaction of the urine.

Quite recently it has been found possible to produce experimental nephrolithiasis. *Ebstein* and *Nickolaier* succeeded in obtaining fine large concretions of this subtance with albuminoid substrata, by nourishing dogs and rabbits with oxamid. We ourselves are convinced of the presence of these concretions in the urinary organs of the animals experimented on, and especially in the renal pelvis.

PATHOLOGICAL ANATOMY.—The usual classification of deposits of the renal pelvis into *gravel* (microlithes), *nephrolithiasis* (gravelle), and *renal calculus*, has been already made. This classification, based on the difference of size, and presenting only a practical interest, is naturally rather arbitrary.

It is universally agreed upon to consider concretions of the size of millet-seed as calculi. These calculi are generally round, ellipsoidal, almond or bean shaped; they are but seldom conical. They rarely reproduce the pelvis and calyces, their size seldom surpassing that of a bean, and renal concretions weighing more than 100 grammes must be considered as something quite extraordinary. Their number is extremely variable, but generally under 100. In one case *Gee* found the dilated pelvis filled with about 1,000 calculi, one of which weighed more than 2 pounds.

Treatises on urine analysis supply every detail on the physico-chemical composition of renal calculi. We will content ourselves with only mentioning here the appearances invariably met with.

Renal calculi formed by *uric acid* and urates are hard and usually smooth. On being broken, the smaller ones present a crystalline, larger ones an amorphous, close, and even sometimes woody, surface. They are always coloured, the colour being sometimes orange, sometimes brown, sometimes even nearly black. Light and dark layers frequently alternate. It seems that uric acid and urates often alone constitute the nucleus, while the concentric laminæ are formed of oxalate of lime (*Seeligsohn*). The contrary is exceptional; layers of uric acid and oxalate of lime, however, are frequently met with.

Oxalate of lime calculi present a nodular, rough and irregular surface, and for this reason are called mulberry calculi. These are the hardest calculi, and are originally of a brownish-gray colour, which may attain very dark tints by an admixture of decomposed blood pigment. Their fraction is amorphous, and often stellate.

Phosphate of lime calculi are of a lighter colour, sometimes absolutely white; they are not very hard, and their surface is either smooth, slightly rough, or facetted.

They are usually found mixed with uric acid crystals. The fact that when broken they present a soft, earthy fracture is in striking

contrast to the rough crystallized one of the ammonio-magnesic phosphates. The triple phosphate is usually found accompanied by phosphate of lime, urate of ammonium, and also, as our own experience teaches us, by oxalate of lime.

The surface is always rough, like pumice-stone, and frequently irregular in shape and branched. We have already had occasion to remark that earthy phosphates compose the crust of the calculi in the greatest number of cases corresponding with the secondary ammoniacal fermentation of urine; nevertheless, it is wrong, as *Ebstein* has proved, to absolutely deny the existence of primary concretions of triple phosphate. These can even lead to secondary concretions of uric acid and oxalate of lime, for the formation of such crusts depends entirely on the acid reaction of the urine, by which one can, by the help of appropriate means, replace the ammoniacal fermentation. The alternating annular layers in most of the calculi sometimes furnish true and certain history of its development and of the condition of the urine.

Cystin calculi are of a pale yellow colour, with a fairly smooth, mammillated surface, and an indistinct stratification, and especially a waxy appearance. *Ebstein* contradicts *Roberts'* assertion, who declares that these calculi turn pale green on exposure to light.*

We will not discuss the rare concretions of carbonate of lime, of xanthin, indigo, and urostealith, for from a clinical point of view they are only of moderate interest. The practitioner will scarcely ever meet with them.

Krukenberg, who recognised paraffin introduced into the bladder by a fragment of a bougie as the chief component of a friable urinary calculus, is of the opinion that the urostealith described in literature is nothing more than paraffin or sealing wax, and he draws attention to the danger of the introduction of loose particles into the bladder by bougies, etc.

After what has been said of pyelitis and renal suppuration of pyonephritic origin, we will only briefly discuss the *lesions* produced in the kidney and the pelvis by calculi. These lesions are most

* *Ralfe* ("A Practical Treatise on Diseases of the Kidneys and Urinary Derangements") observes: "The conditions under which cystin calculi and gravel are formed in the urinary passages are not yet determined. Heredity seems to have some influence; undoubtedly it is frequently met with in the members of the same family. From its containing sulphur, and the close correspondence that exists between its elementary composition and that of taurin, it has been supposed that under certain circumstances its excretion compensates for the deficient action of the liver in the elimination of sulphur. The view I am disposed to take is, that cystin is formed directly from taurin in a manner perhaps analogous to the formation of indigo from indol. The observations of *Naunyn* and *Dragendorff* have shown that normal urine contains traces of bile acids, of which glycocholic acid is the chief, so that it is probable that some portion of the tauro-cholic acid is oxidized, and furnishes the partially oxidized sulphur product which in minute quantities is always present in normal urine."—W. H. G.

frequently unilateral. The foreign body provokes a reaction, *pyelitis calculosa*, the intensity of which (suppuration, hæmorrhage, ulceration) varies to a considerable degree with the character of the calculus. Thus, oxalates with a rough surface are rightly feared.

It must not, however, be forgotten that concretions of a most harmless aspect may produce intense irritation, while, on the contrary, spiny, mammillated calculi are, to a certain extent, bearable.

The details given on the development of phosphates as a consequence of alkaline fermentation of urine show clearly that the evil may begin by pyelitis, and that the concretion may be only secondary or concomitant. The spreading of the inflammatory process of the renal pelvis to the kidney itself, with formation of multiple abscesses, offers nothing of particular interest. If a cure is effected at this period, it may lead to degenerative atrophy of the organ in consequence of the destructive process and of compression. The kidney is replaced by a sac deprived of parenchyma and closely filled with concretions. The other kidney is generally enlarged by way of compensation. A most important incident in the course of pyelitis calculosa, worthy of mention, is obstruction of the ureter by one or more concretions, which may, according to size of the calculus, take place at the orifice of the ureter in the pelvis, or in any other part lower down. In this case also all rough and shiny concretions are to be feared the most.

The symptoms which follow are:—Obstruction of urine and retention of catarrhal products (pus, mucus, blood) in the pelvis, or at the same time in the upper part of the ureter. Ammoniacal decomposition of the urine, with all the consequences already described, frequently ensues from this stagnation.

When the obstruction of the ureter is of long duration, the pelvis and the calyces undergo strong dilatation, the compressed renal tissue becomes atrophied and hydro-nephrosis or pyonephrosis develops itself. In two cases we observed the affected ureter partially transformed into a long pouch of the size of the intestine, filled with innumerable small and large concretions, producing a rattling similar to that of a bag of shot. As to ruptures of hydronephrosis and pyonephrosis in the perirenal tissue, we must refer to what has been already said.

In the further course of renal suppuration, waxy degeneration is a tolerably frequent phenomenon. Sometimes even the "sound" kidney is affected by sympathy. Diffused nephritis is, according to our experience, not such a rare complication as is generally supposed. We have observed it especially with calculous pyelitis exempt from all suppurative processes, and partly combined with decided atrophy.

Uric acid and bilirubin infarction in newly-born infants betrays itself by the presence in the region of the pyramids, at least in the papillary part, of stripes varying in colour from orange to brown. On pressure, a dark liquid oozes from them, and on

examination it is found that in the former case one has to do with deposits of urates, specially of urates of ammonium (*Virchow*) or of pure uric acid (*Ebstein*), which, in the form of granular masses, occupy the canaliculi of the pyramids; in the latter case epithelium, interstitial tissue, and bloodvessels are clogged with needles and tablets of bilirubin.

Apart from the above-mentioned conditions, *infarction of calcium* is often met with in old persons, as also in connection with calcareous metastasis in other organs. They are essentially localized in the medullary cones, and also, according to *Henle*, in the looped canals. They are microscopically manifest by the existence of yellowish-white spots or stripes, similar to gouty concretion, or of a more diffused white colour. Under the microscope one either observes calcification of the tunica propria of the canaliculi uriniferi, which are deprived of their epithelium (*Virchow*), or infarctions with dark granules and globules of the lumina of the canaliculi and their epithelium, or of the capsules; this phenomenon is especially pronounced in the cortical substance, so that the glomeruli can be quite compressed. According to *Ebstein*, these infarctions are not devoid of an organic basis. *Litten* showed, as already mentioned, that coagulative necrosis of the epithelium supplies the most favourable conditions for the precipitation of calcareous salts dissolved in the blood. Whether mortification of the cells proceeding from calcification is also dependent on the presence of bacteria is a question which we must leave open, although *Wagner* has observed the existence of calcareous deposits in the region of the glomerular vessels and the canaliculi uriniferi in cases of acute exanthemata, and especially of diphtheria.

Symptoms.—In certain cases, even the most acute nephrolithiasis is only discovered by chance at the necropsy, the individual attacked having never had the least suspicion of his disease. In other cases, renal calculi may have repeatedly passed with the urine, causing only slight pain; in others obscure symptoms exist, and the clinical picture seems to indicate an affection of the stomach or the bladder, organs found quite intact post mortem. In the majority of cases, however, the disease manifests itself by decided non-equivocal symptoms, which the attentive physician can foresee years before, thanks to the disturbances produced by the excretion of gravel and nephrolithiasis. Of the various symptoms, the most striking are *periodical hæmorrhage*, *intermittent pains* in the renal region, accompanied by slight fever, pains which extend along the ureter, and, above all, the presence of cayenne pepper *deposit* and *gravel* in freshly-passed urine, especially when associated with the symptoms just described. Intelligent patients soon learn by inspection and palpation of their renal excretion the importance of the powdery sediment.

Whether the afore-mentioned subjective and objective initial

symptoms are observed or not, the cardinal symptoms are as follows: *pyelitis* accompanied with *hæmaturia* (considered by *Teuffel* as a constant attribute), *permanent pains*, and, above all, *renal colic*. These symptoms combined are of the greatest importance.

Symptoms of *pyelitis* may appear before or after the development of renal colic. It is not necessary to again discuss the clinical type of this disease. It is obvious, above all, that one should simultaneously discover renal concretions, of whatever

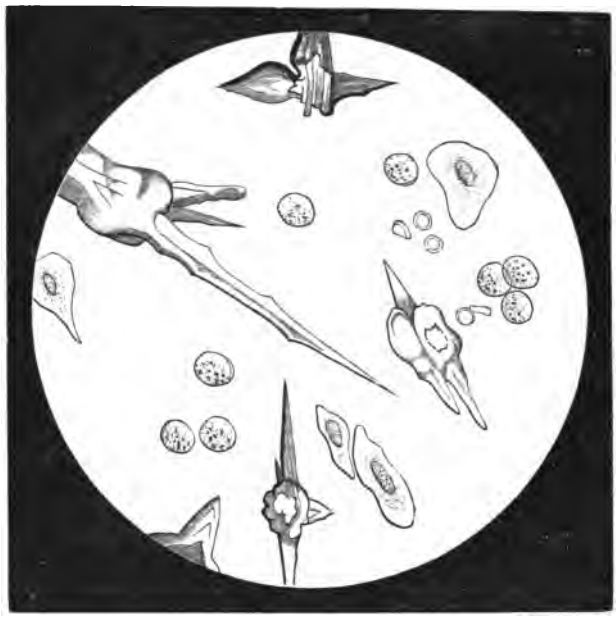

FIG. 3.—URINARY SEDIMENT IN PYELITIS-CALCULOSA.

kind they may be, in the urine, which contains pus and is nearly always acid (Fig. 3).

It is worthy of note that intense hæmorrhages, especially those produced by sharp oxalates, are generally very detrimental to nutrition. In cases where the communication between bladder and pelvis is interrupted by the incarceration of a calculus passing through the ureter, the patient is exposed to all the dangers of suppuration, hydronephrosis, together with those aforementioned, *i.e.*, pyæmia, urosepsis, perforations, etc. In this case a palpable tumour is often met with in the lumbar region (*i.e.*, pyonephritis, pyelonephritis, hydronephrosis). The majority of cases of nephrolithiasis are accompanied by permanent *pains*, the

intensity of the pain varying very considerably. Usually the patients complain of a painful sensation of tension, of dull pressure in the lumbar region, the suffering being increased by extension of the spine: hence the patient instinctively adopts a slightly bent attitude. These pains, when they cannot be accounted for by a catarrhal condition of the renal pelvis, are very probably due to a direct irritation of the nerves by the concretions themselves (*Curnow*, *Ebstein*).

The train of symptoms known as *renal colic* are of quite a different character to these permanent pains. They are a characteristic clinical symptom of renal calculus, and are almost pathognomonic, pointing to the impeded passage of a concretion into the ureter. The passage of blood coagulum, of particles of tumours, parasites, or so-called idiopathic spasm of the ureter, causes in very rare cases genuine renal colic. The pains occasioned are excruciating, so that even the most heroic patient often faints. Their onset may be gradual or quite sudden; they sometimes occur after some physical exertion or jar of the body, or, again, in sleep. They are evidently due rather to violent acute dilatation of the urinary passages above the incarcerated calculus, and to the arrested peristalsis (*Prout*, *Traube*,) than to direct irritation of the mucous lining by the concretion itself.

The centre of pain may be localized about the middle of the ureter of the side affected; it thence radiates over the whole abdomen, and towards the hypochondrium, but especially towards the bladder, the end of the penis and the corresponding testicle, which is often spasmodically retracted, inflamed and swollen. Pains in the direction of the thigh are often taken for paræsthesia. Nausea and vomiting frequently occur; this explains why paroxysms are sometimes referred to gastrodynia, and biliary or intestinal colic.

The attacks, the duration of which varies from some hours to several days, present alternate remissions and exacerbations. During the latter the face becomes pale and drawn, the extremities cold, the pulse feeble and frequent; fever and rigors set in, and the unfortunate patient, covered with sweat and writhing in agony, is literally almost at death's door. In children the pain frequently produces convulsions.

The attacks are usually accompanied by intense *strangury*, the patient only passing a few drops of concentrated, and often hæmorrhagic, urine at a time. It is only in cases of complete blocking of the ureter, and when the function of the other kidney is quite normal, that the urine is clear and light-coloured. This is an important sign of the normal condition of the latter.

Relief is usually abrupt; the calculus overcomes the last obstacle and enters the bladder, the final great increase of pain being followed by a sense of intense relief. When concretions obstruct both the ureters and the urethra, or when the patient

with the unilaterally obstructed ureter only possesses *one* kidney, death with uræmic symptoms ensues, sometimes in the course of the first day, if obstruction is not quickly removed. In exceptional cases anuria, coma, or convulsions are tolerated for a week or more.

Medical literature contains examples of extraordinary tolerance of the organism in the presence of retained urinary matter. In a case described by *Schwenger*, in which the left kidney had been removed, obstruction of the right ureter with consecutive anuria lasted for eight days. Uræmia only occurred on the tenth day of the obstruction. *Paget* observed anuria lasting twenty days without uræmic symptoms; and *Russell* recovery after twenty-eight days of complete anuria.

The explanation of such cases is difficult, where, in spite of the blocking of one ureter, and normal (or tolerably normal) functional activity of the other kidney, death occurs through suppression of urine. In such cases we admit the validity of the view that its function is suspended in a *reflex* manner. We are inclined to agree with *Godlee's* and *T. Israël's* view. These observers, as well as *Sonnenburg*, saw death supervene after a successful nephrolithotomy, and they concluded that the incarcerated calculus in the ureter was responsible for the reflex suppression of function in the normal kidney. *Israël* seems to be right in comparing this phenomenon with the violent contraction of the renal vessels occurring on irritation of the severed sciatic nerve (*Cohnheim* and *Roy*), as well as with the complete angio-spasmodic anuria lasting for days in hysterical individuals (*Charcot*). *Senger* drew attention to a very important point in such cases as these, viz., that the antiseptics employed may cause a lesion of a "sound" kidney, a lesion which becomes the starting-point of functional suppression. Owing to a lesion of the excreting organ, the removal of toxic materials is obstructed, which, even without obstruction, have a deleterious effect on the brain. This fact must be added to the "degenerative uræmia," a sequel to toxic destruction of renal epithelium or coagulative necrosis (*E. Fränkel*). Hence the clinical type of a modified uræmia.

In other cases perforations of the ureter have been found followed by fatal peritonitis. These perforations may take place in various directions.

When renal colic disappears gradually, the reason may be found in the crumbling away of the concretion within the ureter. Experience teaches that repeated attacks of colic are less violent than the first ones, and the fact that the ureter has become distended by the passage of former concretions, and its sensibility somewhat decreased, must be looked upon as a partial explanation.

Abortive attacks of renal colic are far from being rare, and, according to our opinion, are too much neglected. During these

attacks one or other of the characteristic symptoms often appear, their resemblance to a characteristic paroxysm depending on the degree of intensity and the size and shape of the calculus.

Calculi eliminated by the ureter usually remain for a considerable time in the bladder, and are only found in the urine several days after the attacks have ceased. Some authors describe cases in which calculi were found to be really gall-stones, which had somehow found their way into the bladder. In such cases, when, in spite of strict search, the calculus is not discovered, it is only natural to think it has returned to the pelvis.

Uric acid and bilirubin deposits in newly-born infants do not generally occasion serious disturbance of the renal function; at most they render micturition somewhat difficult. Red powder is found on the diapers. Their abnormally long persistence seems to produce a diminution of resisting power to other diseases (pneumonia, intestinal catarrh, etc.). The presence of gravel in the renal pelvis of infants manifests itself more by characteristic symptoms resembling those previously described. We have fairly frequently observed serious attacks of convulsions, and later on, at a more advanced age, observed symptoms of violent renal colic. These phenomena are explained by the discovery of deposits or of casts.

Up to the present the symptoms connected with *calcium deposits* or *calcium metastasis* have not been described. *Virchow*, *Grohe*, *Küttner*, and *Litten* have described some cases. According to the latter, functional disturbances of the kidney, such as oliguria and dropsy, occur when these disturbances are associated with cardiac debility and anæmia.

We are not certain whether we should place two cases observed by us in this category. Two very neurasthenic men with chronic posterior urethritis, and presenting symptoms of pyelitis, passed an enormous quantity of crystals of phosphate of lime, granules of carbonate of calcium, and genuine gravel, deposits which from time to time made the urine milky, and formed chalky sediments at the orifice of the urethra.

Diagnosis.—The diagnosis is chiefly arrived at by the presence of the aforementioned symptoms. Testing *fresh* urine makes it possible to determine the nature of the calculus and the existence of concomitant pyelitis. If crystals of uric acid, of oxalate of lime, and some blood corpuscles, are to be found in not too highly-concentrated urine immediately after emission, *Rosenstein* contends that these facts, together with the aforementioned etiological factors, lead to the suspicion of nephrolithiasis as most likely. We would agree with him, if we had not in the course of years had the opportunity of observing individuals with the above-named symptoms in whom nothing of the kind occurred under prolonged observation.

In order to make a correct diagnosis of calculous pyelitis in its

earliest stages, the microscope must be used. Leucocytes can be entirely covered by blood corpuscles. Later, when pyuria develops, irregular variations in the proportion of albumin are observed.

The possibility of genuine renal colic without nephrolithiasis must not be forgotten; nor must one be led astray, as genuine renal colic is often accompanied by gastric phenomena, especially cardialgia and vomiting, and by bladder symptoms. Advanced nephrolithiasis often lurks behind many a "vesical catarrh" diagnosed by an inexperienced and careless physician.

In spite of every care, it is not always possible to avoid confusion with simple pyelitis, tuberculosis, cancer, and renal parasites (compare diagnosis of pyonephritis, of pyelitis, and of pararenal abscesses).

We will later on discuss the differential diagnosis of *renal tumours*, due to nephrolithiasis and tumours of other organs, as hydronephrosis furnishes the most decided characteristics.

The question as to whether *only one kidney*, and *which one*, is affected, is of the greatest importance, especially if operation should be decided upon. It is most probable that one kidney is sound, when normal clear urine is passed during an attack of colic in place of urine containing pus, whilst the reverse cannot be proved as long as pyuria lasts, if the ureter of the affected kidney is not completely obstructed. *Rosenfeld's* experiments have proved that, as a result of excision of one kidney, the remaining organ does the work of both. As far as the other question is concerned, the proof of unilateral sensibility in the lumbar region, unilateral colic is of some importance. More definite results should be obtained if it were possible to examine separately the urine excreted by each kidney; we say "should," for, in spite of the number of more or less ingenious methods recently suggested to decide the point (many methods have only been tried post-mortem), experienced and far-sighted practitioners content themselves with an honest "non liquet." Finally, we must agree with *Thiriar's* remarks on the want of a practical method.

The procedure is easiest in *women*, as a dilatation of the urethra, by no means always harmless (*Simon*), especially in conjunction with the use of electric illumination of the interior of the bladder (*Newman*), or with incision of the vesico-vaginal septum (*Emmet*), allows of urine being obtained from each ureter by means of small tubes. That the simple introduction of a small open speculum as far as the opening of the ureter into the bladder (*Lewers*) can be considered as safe is not to be thought of. On the other hand, *Pawlik* has shown that catheterism of the female ureter, even without previous operation, in the knee-elbow, or exaggerated lithotomy position, is possible (*Newman* corroborates this), inasmuch as the anterior wall of the gaping

vagina, urethra, trigonum, and orificial portion of the ureter, are visible, and thus the direction of the instruments can be controlled. Every doubt as to the fact that the latter has really entered the ureter is cleared up by the passage of clear urine after the bladder has been filled with milk. This method used by *Warnots* has certainly undoubted advantages over the first-mentioned surgical ones, but we doubt whether any considerable number of physicians, in spite of long practice, acquire sufficient ability to practise this in a routine fashion. Only those with deft hands can be trusted to successfully employ this method. Suture of the ureter, a procedure already mentioned by *Hildebrand*, *Chrobak*, and *Pawlik*, but first practised by *Sänger*, has also been the subject of much discussion, but the trustworthiness of the method has not been proved. In women, especially in cases of pregnancy, *Sänger* declares that the ureter can be felt through the vagina somewhat below the external os uteri. When urethritis is present, it is specially noticeable as a tender, thickened cord. *Warkalla* proved that in the cadaver a suture may really block the urinary passages. It is still doubtful whether *Sänger's* method can replace the treatment by means of the sound.

It is obvious that these misgivings are more specially marked in regard to men, and celebrated surgeons have contented themselves with terming the suggested manipulations "impracticable" and "adventurous." Clamps have been invented, resembling a lithotrite, for the temporary occlusion of one or other opening of the ureter into the bladder. These instruments are, however, so difficult to handle that their general use is out of the question. Nineteen years have passed since the ingenious instrument devised by *Tuchmann* was first brought to the notice of medical men. It has, however, only been employed on the cadaver and by the inventor on himself; and we must, although he has lately tried again to popularize the instrument, ask the question, after several attempts with it ourselves, how the practitioner will be able to manage the very delicate manipulations, and rightly diagnose the characteristic jerk of the instrument to ensure a complete occlusion?

The opinions as to the danger and difficulty of applying the clamps are by no means unanimous. The same can be said of *Ebermann's* and *Polk's* instrument; these authorities recommend compression of the ureters between a catheter and staff. This procedure, as well as that of *Weir*, has been but little employed; the latter occludes the ureter per rectum by means of a lever; *Sands* used the finger. *Silbermann* suggests a kind of compressor, based on the principle that an indiarubber bulb is conducted by means of a special catheter to the orifice of one or the other ureters and filled with mercury. We are not, however, convinced of the success of this ingenious instrument. One of

the latest methods is the temporary compression of the ureter per rectum in the pelvis (*P. Müller*). The body is brought into a position in which the pelvic portion of the ureter runs in a horizontal plane; an elastic tube, with a bulb filled with several pounds of mercury, is passed into the rectum. This method is said to be practical and certain, but we must not omit to mention that the inventor has only made *one* attempt on the living subject. For the sake of completeness, we must not omit to mention *Fenwick's* latest advice, to place a catheter with a bent and lateral opening in the empty bladder. This catheter is said by him to incline towards the orifice of the ureter, and thus by suction to draw the urine into a receiver.

The suggestions made by *Czerny*, *Harrison*, *Lawson Tait*, and *Thornton* are quite on other lines, and they cannot be accused of uncertainty. *Czerny* makes a fistula of the renal pelvis on the affected side in order to conduct the excretion of the other kidney separately into the bladder, a process which is of great use as a primary operation in cases of nephrectomy; the others recommend a perinæal incision and laparotomy for the exploration of the ureter, or direct manual examination of the kidneys. How far such radical interference deserves to be called crude and dangerous must be decided by further clinical experience. Finally, *Iversen* has not hesitated to render the ureters accessible to catheterism by a suprapubic operation.

So much for the various methods and their value—methods which are, unfortunately, often open to severe criticism. Before the practitioner has by practice been able to acquire the necessary dexterity, many a kidney diagnosed as sound will prove itself to be diseased when seen on the operating and dissecting table, and many a one diagnosed as diseased to be sound. Happily, however, the circumstances are not always so unfortunate as to necessitate recourse to those methods. Above all, we must draw attention to the change taking place in the urine through hermetic occlusion of the ureter by concretion in the affected kidneys, to the importance of pus brought into the urine by pressure of the purulent kidney (*Bergmann* and *Teuffel*), and finally to the diagnostic advantage of the relatively safe nephrotomy, which has become more and more a procedure preliminary to excision of the kidney. Worthy of special notice is the fact remarked by *Israël* in a case of operated unilateral pyonephrosis, which through uræmia proved fatal, that the other kidney, which on account of the *normal excretion of urine* and the absence of cardiac hypertrophy was considered sound, was greatly contracted. We have already discussed "reflex" anuria and fatal uræmia. Such observations show how easy it is to miscalculate the power of Nature, even though the urine be tested before the operation.

It is evident that direct palpation of the organ by means of

Simon's manual rectal examination may be of the greatest importance for the diagnosis of nephrolithiasis.*

PROGNOSIS.—The prognosis of nephrolithiasis is always serious, for it is not only a question of recovery, but one of life and death. The chances are most favourable when only one kidney is affected, without serious pyelitis—pyuria, and not hæmaturia, which terrifies the patient, causes anxiety to the physician (*Rosenstein*)—and when the size of the concretions is such as to allow their passage, and when suitable measures can hinder further formation of calculi and gravel. The sooner the illness is recognised and treated, the more favourable the prognosis.

Without deserving absolute confidence, the agents employed to counteract the fresh formation of sand, of gravel, and of calculi, are nevertheless of well-proved efficacy. We know of more than a dozen cases in which, through suitable curative measures, complete cure has been obtained, after patients have passed sand and suffered from attacks of severe colic for months, and even years.

The dangers of bilateral diseases, of uræmia produced by anuria, and also those of pyonephrosis, have already been discussed.

In spite even of large-sized concretions filling the whole pelvis, recovery may take place by atrophy and contraction.

Complicating renal abscesses generally take a chronic course, and may after years cause death in some way or other, even in cases where the other kidney is quite healthy.

Formerly we had no idea of the influence that surgical interference exercised on the prognosis. At the present time the treatment of nephrolithiasis is nearly always surgical, and in consequence renal calculus is rightly referred to as "surgical renal disease."

TREATMENT.—The treatment must be considered under three heads: (1) prevention of the formation of renal deposits; (2) removal of already formed concretions; (3) combating the symptoms caused (calculous pyelitis, with its consequences, renal colic).

1. The dietetic and therapeutic measures destined to fulfil the first of these indications vary according to the nature of the ex-

* *Englisch* describes the following case of simple bilateral large renal calculi: A man aged thirty-two had suffered for many years from disease of the urinary passage subsequent to gonorrhœa. In the course of the disease a urethral fistula (which afterwards healed) had formed itself on the perinæum. The chief symptoms were strangury, pyuria, albuminuria, and once even renal hæmorrhage. Death took place from cachexia. A year previously no renal alteration had been observable, and autopsy revealed the pelvis of both kidneys strongly hypertrophied, and almost filled with a large stone, chiefly constituted of phosphates. That in the right kidney weighed 78 grammes; that in the left 72 grammes. The parenchyma of both kidneys was strongly atrophied. The coating of the ureters and bladder was thickened, the mucous membrane of the urethra partially fibrously degenerated.—W. H. G.

cretion, quite irrespective as to whether we have to do with the elimination of cayenne-pepper deposit, precursory to future concretions, or with already-formed gravel and calculi.

Uric acid gravel is the most frequent. In this form the first thing to be done is to reduce the acidity of the urine, to prevent excessive development of uric acid, and to oppose a too strong concentration of urine. In order to carry out this successfully, a suitable *diet* must be prescribed from the outset. A large amount of meat must be forbidden, although it is far from being proved that the formation of renal deposit is increased by meat. Entire suppression of meat is exceedingly unwise, for the want of nitrogenous nourishment may produce a more considerable elimination of uric acid than abuse of animal food. According to *Cantani's* recent experiments on the relationship between nourishment and the reaction of urine, it can be seen that vegetables, herbs, and gluten produce least, and cereals and milk, on the contrary, most acidity. Meat, eggs, and sugar are between the two groups. The diet must be controlled without quite excluding the representatives of the second group. Sugar, fat, alcohol, spices, have been always forbidden, although theoretical and empirical foundation for this prohibition is in many ways very weak. The physician may certainly forbid the exaggerated use of these substances, and also of acid wines and non-matured beer, when they are not of first-rate quality, but our present knowledge does not in the least authorize us to forbid them entirely. The chief rule is to eat in moderation (*Ebstein*), to choose nourishment which suits the stomach, attend at once to the least digestive disturbances, and to regulate the functions of the bowels. Our personal unprejudiced experience, based on daily observations, permits us to affirm that, in following these general rules, occasional deviations from the "rational" régime are less hurtful than absolute cutting off of the greater part of our ordinary food, accompanied by the abuse of "permitted" nourishment. A great number of patients have dispensed, to their own advantage, with the too strict observation of former prescriptions.

A stricter regimen is decidedly of advantage in cases where lithiasis is complicated with genuine gout and obesity, but even then, by reducing the carbo-hydrates, one may allow meat, and a corresponding quantity of fat (*Ebstein*), which prevents oxidation of albumin and want of nourishment. In order to obtain as complete an oxidation as possible of the uric acid arising from albuminoid substances, bodily exercise, occupations in the open air (walks, skittles, gardening, shooting, etc.), are advisable. Even the apparently exaggerated intake of nitrogenous nourishment is not hurtful, when it is in a relative proportion to the organic expenditure (*Ebstein*).

According to our personal experience, frequent hot baths, especially *salt baths*, but not Turkish baths, are of great use.

They aid circulation and diuresis, and serve to diminish the formation of uric acid (*Pfeiffer*).

The effect of partaking plentifully *of water* is clear. It is not necessary to prescribe old-fashioned diuretic infusions.

2. It is rational treatment to try to obtain chemical dissolution of calculus through alkalies (*Brücke*). The results are, however, from an unprejudiced point of view, not very brilliant; indeed, in spite of the marks found on large calculi (which seem to be produced by the dissolution of uric matter), it is questionable whether this method can do more than prevent the development of fresh deposit. Be this as it may, the majority of physicians have obtained in this manner, not only temporary and even permanent improvement, but also occasional cures.

The methods employed are numerous. We will only mention the most important: Tribasic phosphate of soda (*Heller, Binz*), which suits most patients, and has a very decided dissolving action. Carbonates and vegetable alkalies, which are found as carbonates in the urine; the grape and fruit cure belong to this class. Finally, lithium, in the form of its carbonate, benzoate and salicylate salt. Various authors, especially *Garrod*, contend that the dissolving action of these salts is greater than that of potassium and sodium.

To avoid disturbing the organic equilibrium by creating a disproportion in the blood between potassium and sodium, *Cantani* recommends a mixture of various alkalies.

The administration of alkalies in the form of mineral waters is especially efficacious. This is evidently because treatment such as this unites all the factors apt to strengthen the constitution and to produce oxidation of uric acid, by baths, regular diet, exercise.

The following watering-places enjoy a special reputation in this respect: Bilin, Contrexéville, Driburg, Fachingen, Friedrichshall (these waters constitute the basis of *Thompson's* complicated treatment), Geilnau, Giesshübel, Karlsbad, Marienbad, Neuenahr, Tarasp, Vichy, Wildungen; in addition, Assmanshausen, Baden, Dürckheim, Elster, Ems, Eperies (Salvator), Obersalzbrunn, Salzschlirf, Weilbach, Wiesbaden, may be mentioned.*

The latter waters also contain lithia, but the proportion is decidedly too small for us to be able to recommend them as of essential use. *Struve's* lithia-water, and, above all, *Ewich's* lithia-soda-water (containing 0·60 gramme of carbonate of lithia to the litre), are far better. It remains to be proved whether lithia in small doses is of more use than carbonates of alkalies.†

The last few years have thrown much fresh light on what was formerly known on the subject of litholysis. Nevertheless we

* Bath, Evian, Chianciano, Gleichenberg, Ibero, Irno, La Torretta, Matlock, Monte Dore.—W. H. G.

† Piperazin, a few years ago so much recommended, has, after recent investigations, been proved to be without efficacy, and even harmful.—W. H. G.

must mention a very remarkable series of experimental researches made during this time. These researches demonstrate the effect of certain drugs and mineral waters in the uric acid diathesis.

From *Jahn's* analysis it seems that the substance which dissolves uric acid most readily is carbonate of lithia. Bicarbonate of soda is slightly efficacious, then come borax, boracic acid and borocitrate of magnesia. *Ebstein* rightly observed that all these researches are of no practical value for the physician, and that carbonate of lithia appears in the urine in the form of the almost inefficient chloride of lithia. Finally, for the same reason, the method which *Pfeiffer* and *Posner* have lately adopted is worthy of more attention.

Both these authors, instead of analysing the drugs and the mineral waters, have made their experiments with the urine passed, after partaking of the substances, and by comparing pure and uric acid concretions after their exhibition in known doses. *Pfeiffer* found that salt springs (Wiesbaden) have only a very weak dissolvent action on uric acid, and that alkaline and hydrochloric waters are much more efficacious (Carlsbad-mühlbrunnen).* Fachingen water, rich in carbonic acid and sodium, gives the best results, lasting several days. All these results have been confirmed by *Posner*. At the same time, this shows that the dissolving action of alkaline waters on uric acid depends on the quantity of bicarbonate of soda contained in them. Thus, it is obvious that besides Vichy (Grande Grille), the comparatively unknown Vals (source Désirée) and Passugg (Ulrikusquelle) are more efficacious; while Wildungen (Helenquelle) and Salzbrunn (Kronenquelle) may, on the contrary, be classed after the waters of Fachingen. The action of these last-named waters is analogous to that of bicarbonate of sodium administered in a daily dose of 4 to 5 grammes, to *Cantani's* mixture (bicarbonate of sodium, carbonate of lithia, citrate of potassium), and to borocitrate of magnesia. This last substance appears to be the very expensive basis of the nostrum "Litholydium," which owes its celebrity to the enormous extent to which it has been advertised. Naturally, gravel and genuine calculi offer a much greater resistance than granular uric acid. Contrary to *Pfeiffer's* somewhat daring conclusions, *Posner* rightly thinks that the hope of dissolving concretions of large size is somewhat chimerical.

Pfeiffer and *Posner* have arrived at no other results regarding the active value of lithia waters and of carbonates than those already described by us. To speak of a lithium effect of the former is erroneous, and the latter can at most only produce temporary relief.

We have for years frequently substituted in our practice alkali in medicinal form for natural mineral waters. If the patients

* Battaglia, La Bourboule, Harrogate, Monte Catini.—W. H. G.

have the time, and their financial situation permits of it, we send them to a suitable watering-place. If such is not the case, we prescribe the waters at home or give *Sandow's* (Hamburg) artificial salts. These salts, composed of the active constituents of the different springs, have generally great value; and thus we have no doubt that these artificially prepared waters are not much inferior to the natural waters of identical type with regard to their litholytic and general effects.

Although this effect is very difficult to estimate, we are convinced of their value by experiments made in cases where, during certain periods, gravel and sand appeared almost daily in the freshly passed urine. Concretions of gravel, passed in large quantities in the urine during attacks of renal colic, are no proof of the effect. But we by no means wish to say that the use of one or other of the aforementioned mineral waters at the watering-place itself does not often offer much more favourable chances. The observations which we have made at Vichy daily prove this. As to Carlsbad, although its superiority is already a thing of the past (*Ebstein*), thousands of observations prove that appropriate treatment at this watering-place justifies its old reputation in the uric acid diathesis. In fact, as *J. Mayer* so rightly remarks, the evil is attacked from several sides at one and the same time. It is a fact that, besides the dissolving influence exercised on already formed concretions—the dissolving influence of Fachingen waters and those of the last-named places is still more marked—Carlsbad waters prevent the development of uric acid and decrease its production. Finally, the conditions of the urinary organs themselves may play an important part in the process. For good reasons, we will not enter into the details of the use of the various natural and artificial waters. It is obvious that they agree best with the digestive organs when taken warm.

It is essential to be careful not to exaggerate "alkaline treatment." The urine and its sediments must be most conscientiously controlled in order not to fall from one danger into another, and not to replace the urates by phosphates (*Rosenstein*). However, we, like *Roberts*, have never made a similar observation. If any organ revolted, it was the stomach. For this reason, we recommend intermissions, which, if *Pfeiffer* and *Posner* are to be followed, in no way decreases the chemical action of the waters, if they are strongly alkaline.

When lithiasis is produced by oxalate of lime, the chief point in the diet is to avoid all vegetables containing oxalic acid, such as cocoa, tea, sorrel, rhubarb, spinach, as *Esbach* has proved them to contain a large quantity of oxalic acid. *Cantani's* recommendation to limit carbo-hydrates is not yet confirmed.

In cases where the nourishment entirely consists of animal food, *Mills* observed an abundant excretion of oxalic acid.

Gallois and ourselves, by personal experience, have ascertained

that, contrary to *Beneke's* and *Lehmann's* theory, excretion of oxalate of lime undergoes an essential diminution under the administration of carbonates and alkali, especially when taken as Vichy water. *Cantani* shares our opinion. *Esbach's* recent researches explain the efficacy of these agents. This author shows that, in cases of simultaneous use of alkali in an insoluble form, oxalate of lime introduced into the stomach with the food is evacuated with alkaline intestinal excretions. Strange to say, in spite of the efficacy of alkalies, practically all the attempts made to increase the conditions favourable to the dissolution of oxalates, such as increased acidity of the urine by administering mineral acid, remain without result, as we have already had occasion to remark. Perhaps a causal treatment to the extent of counteracting intestinal affections, according to *Ellis's* theory, may prove successful.

The administration of acids has generally a better effect in phosphatic precipitation. For this object mineral acids are recommended, such as hydrochloric, phosphoric, or carbonic acids (*Heller*) — the latter also in the form of effervescing water— further organic acid, and lactic acid (*Deecke*, *Cantani*). It frequently happens that the desired end is not attained, viz., acid reaction of the urine. This arises from the fact that one always gives very small doses; but the principal obstacle exists in the ammoniacal fermentation of urine, which here plays the chief part, and which usually cannot be removed by purely chemical means.

Salicylic acid is a most rational therapeutic agent (*vide* "Treatment of Vesical Catarrh"), and we recommend it most strongly in a large number of cases.

Beale recommends large doses of carbonate of ammonia against *cystinuria*. We have no personal experience on this point. In this case also, from a therapeutic point of view, we must not forget the importance of intestinal bacteria.

3. For details on the treatment of calculous pyelitis and its sequelæ, we refer our readers to the sections on renal suppuration and vesical catarrh. We must add *surgical* treatment of nephrolithiasis—a very important question—to the list of therapeutic methods. *Simon* and *Czerny* are the exponents of this modern treatment, and they have brought it to perfection. *Dawson* had practised nephrolithotomy before them — *i.e.*, the removal of renal calculus by external incision.

It is not our intention to treat of renal operations, details of which are to be found in every modern manual on surgery. Nevertheless, we consider it will not be out of place to shortly review the present position of *renal surgery*, and *its results*, and we take the opportunity of doing so now, as nephrolithiasis and its sequelæ offer the most frequent opportunity for operative measures.

The discussion will cover renal suppuration, hydronephrosis, neoplasmata, and displacement of the organ.

We may consider as the chief operation, incision of the kidneys with conservation of the parenchyma, "nephrotomy," and excision of the organ, "nephrectomy," which latter method *Simon* first carried out with great success in 1871. The kidney is rendered accessible either by a lumbar extraperitoneal incision (retro, extraperitoneal method), or by laparotomy, which opens the peritoneal cavity and divides the peritoneum (transperitoneal method). We do not intend to further discuss the numerous variations in these operations (*Simon's* incisio postica lateralis, *Thompson's* lumbar-abdominal incision, *Bardenheuer's* extraperitoneal explorative incision, etc.). Almost every great surgeon has his favourite method.*

* *Hume*, "A Case of Lumbar Nephrectomy for Calculous Kidney, and One of Abdominal Nephrectomy for Sarcoma—Recovery:" *Lancet*, vol. i., 1893.—"The numerous cavities of the kidney in Case 1 contained each either calculi or soft calculous matter and pus. It is obvious that nephrotomy and drainage would have done nothing towards effecting a cure. The only feasible measure was nephrectomy, even though this was carried out in some uncertainty as to the working power of the other kidney. The normal state and quantity of the urine, save for the presence of pus, were evidence in favour of the latter being functionally competent. The polyuria following the operation indicates undoubtedly the strain thrown upon the remaining organ, and points to increased blood-pressure and some degree of vascular congestion. In Case 2 the absence of symptoms was a striking feature. Hæmaturia, which is said to occur in only about one-half the number of cases of malignant renal tumour, was probably prevented by early blocking of the ureter; and to the same cause was due the absence of other alterations of the urine. The freedom from previous exhausting loss of blood was a fortunate circumstance, influencing materially the chances of recovery. In the performance of the operation the incisions made gave ample room, and rendered comparatively easy the detachment of the tumour. With regard to the nature of the growth, it proved to be a large round-celled sarcoma. It grew from the upper part of the concave border, so that unaltered kidney was expanded over the posterior aspect of the tumour. The account of these cases is taken from notes by Mr. W. Martin, house surgeon.

"*Case* 1: *Calculous Kidney; Lumbar Nephrectomy.*—A moulder, aged forty-three, was admitted on September 8, 1892, complaining of pain in the back. Three years ago he had first felt this pain, which was brought on specially by movement and stooping. He had attacks, often very severe in character, and lasting from a day to a month, and these attacks have been repeated down to the present time. His urine has contained a deposit of a milky colour, increasing gradually in amount. During the last twelve months his health has broken down, and he has lost 2 stones in weight. The only important point in his previous medical history is that he was operated upon for stone in childhood. His appearance on admission was that of a feeble, anxious-looking man, who walked with stiffened gait, as if in pain. He was 5 feet 4 inches in height, and weighed 6 stones 11 pounds. His pulse was feeble, his temperature normal. On examining his abdomen a rounded, firm tumour about the size of a cocoanut could be felt projecting under the ribs on the left side. Below, its margin was well defined; above, the mass disappeared underneath the ribs. The swelling was dull on percussion, and the dulness extended laterally and behind as high as the angle of the scapula. The mass was fixed, or moved only very slightly during forced respiration. It was tender on firm pressure. The lumbar sounds were clear. The urine was of normal quantity and composition, save that it contained a large amount of

Shortly after *Simon's* first successful experiment, excision of the kidney became very popular, and even at the present time

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pus. During his stay in the hospital, rest and treatment relieved his suffering, but he steadily lost flesh at the rate of 2 pounds to 3 pounds a week.

"On September 26, the presence of pus having been previously demonstrated by the hypodermic needle, the kidney was cut into by lumbar incision. A large quantity of fetid pus was evacuated, and the finger passed into the kidney found calculi and calculous matter in different cavities. It was then determined to remove the kidney, and the first incision was extended towards the linea semilunaris, and for a couple of inches downwards along the outer border of the rectus. In this way ample space was provided. With the finger, the tumour was gradually separated from the thickened and adherent peritoneum, and as the separation went on it had to be forcibly dragged down from under cover of the ribs. The thickened pedicle, containing artery and vein, was transfixed and tied; the dilated ureter was secured into the wound. In trimming away some of the thickened tissue in front, an opening was accidentally made into the peritoneal cavity. This was closed by drawing forward the edges and tying a ligature round, instead of suturing. The operation was completed by suturing the wound and placing two drainage-tubes, one in the upper and the other in the lower pouch of the large cavity. During the afternoon following the operation 12 ounces of urine were passed. The evening temperature was 103° F., the pulse 120. The patient was not markedly collapsed. Next day the temperature fell to normal, and the subsequent recovery was steady. The patient was discharged in good health at the beginning of November. During convalescence one point with regard to the quantity of urine passed was noteworthy. Before operation the average daily quantity had been 40 to 50 ounces; after operation there was a gradual increase, reaching 90 ounces on the sixteenth day, and up to the time of discharge the quantity continued abnormally large; it contained a trace of albumin.

"*Case* 2: *Sarcoma of Kidney; Abdominal Nephrectomy.*—A clothier, aged forty-one, was admitted on October 28, 1892. He stated that for a year he had been losing weight, but did not feel ill. Three months ago he first had pain in the left side, which shot across the body and down to the hip-bone, but it was not severe. A swelling in the left side was detected by his medical man a few weeks before admission. He was a thin, unhealthy-looking man, with acne rosacea on the face. In the abdomen, a tumour the size of a fœtal head could be felt under the left costal margin. It was nodular and hard, with an irregular outline, well defined below, and passing under the ribs above. On respiration, the tumour moved to the extent of an inch and a half. On percussion, a broad tympanitic area was found over the front; the lumbar sounds were dull. The urine was acid, specific gravity 1023, light in colour, and contained no blood or sediment; there was no albumin or sugar.

"On October 31 an incision, about 6 inches long, was made from the margin of the ribs in the linea semilunaris. The abdomen was opened, and the tumour found to be in the left kidney. A lumbar incision was then made from the middle of the first cut, dividing all the structures forming the abdominal wall, including the peritoneum. The intestines were pushed towards the right and protected with sponges. The peritoneum covering the kidney was then separated until the whole growth was exposed. The separation was first carried out anteriorly to nearly the position of the pedicle; then, the lower end being detached, the tumour could be lifted out of its bed and drawn down. The freeing of the upper part was facilitated by a broad retractor passed under and raising the ribs. The vessels forming the pedicle were in part directly ligatured, in part clamped and afterwards tied. No bleeding of any moment took place. The large cavity left was packed with sublimate gauze dusted with iodoform, the ends of the strips being brought out through an opening made specially for drainage in the most dependent part of the loin. The whole extent of the wound was closed layer by layer with silk sutures,

there are advocates of this operation, as opposed to nephrotomy.* Notwithstanding, a decided conservative tendency has lately asserted itself, for, in spite of a number of most satisfactory results of the excision of calculous and cystic kidney, malignant neoplasmata and cysts of *von Bergmann, Billroth, Braun, Czerny, Hahn, Israël, Klaus, König, Kosinski, Langenbach, Ollier, Schede, Schmidt, Schonborn, Thornton, R. Wolff*, and others, the statistics have proved unsatisfactory and discouraging.

Gross states that in the year 1855, out of 233 cases, there was a mortality of no less than 44·6 per cent., which percentage, including cases of sarcoma and carcinoma, amounted to 61 per cent. (laparotomy 65, lumbar incision 45, per cent.). *De Jong* a year later published even more unsatisfactory results of nephrectomy in cases of malignant tumours, viz., a mortality of 74 per cent. The same year *Brodeur* published the most complete statistics of nephrectomy and nephrotomy, viz., 327 cases. Recovery occurred in 138 cases; of these 78 were cases of nephrolithiasis and pyelonephritis from various causes (in cases of excision of the organ only 56 per cent., in cases of nephrotomy 67 per cent.). Out of 32 cases of hydronephrosis, 23 were cured (with nephrectomy 60, nephrotomy 100, per cent.) Finally, the removal of the organ in tuberculosis (18 cases), carcinoma (12 cases), sarcoma (29 cases), fibroma (10 cases), and floating kidney (36 cases), had a percentage of 44·50, 48·80, and 50 per cent. *Von Bergmann* and *Schede* believe that a better diagnosis and technique will produce better results. Indeed, apart from the special aggravation of the prognosis through laparotomy, the operation is not without danger, in spite of every antiseptic precaution, when extensive adhesions, injury to the vessels, and advanced weakness of the patient, are present. The question of excision has another important aspect, viz., the functional condition of the remaining organ. This is proved by *De Jong*, who attributes a mortality of 14 per cent. in his cases to the fact that the other kidney was in bad condition. Therefore

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the skin being finally brought together with silkworm gut. Thirty-six hours after the operation the gauze was removed and a drainage-tube inserted through the opening. For some days after the operation the patient had slight diarrhœa, and, probably from some fouling of the dressing, the lower part of the wound suppurated, and there was a rise of temperature. From the same cause it was difficult to measure the quantity of urine or estimate the amount of urea. At the end of a week the quantity passed in one day was 42 ounces, and contained 463·68 grains of urea. Except for the slight suppuration, recovery was in all respects satisfactory, and the patient left the hospital in good health on November 29."—W. H. G.

* *Alsberg* (*Therapeutische Monatsheft*, August, 1894) describes a case in which he performed nephrolithotomy in consequence of the formation of stones. After the first incision the patient was perfectly re-established; later on, however, the old symptoms, pointing to lithiasis, again appeared. As the patient was exceedingly emaciated, the large renal sac containing stones was easily felt, but the condition of the patient was such that the usually so easy operation was impossible.—W. H. G.

it is not surprising if of late English, American, and also the best-known German surgeons have come to the conclusion that, with the exception of selected cases suitable for excision, nephrotomy is indicated as being the less dangerous method, followed by secondary nephrectomy where necessary (*von Bergmann, Czerny, Guyon, Lauenstein, Thiriar*, and others). We must elsewhere discuss the least dangerous method of all, viz., nephrorraphy (*Hahn*), when speaking of floating kidney. Although it is impossible to speak of a general indication for nephrectomy, yet most surgeons agree (*vide Braun, le Dentu, Herézel, Wagner*, and others) that the operation should be reserved for severe injuries to the kidney, rupture of the ureter, almost totally destroyed calculous kidney, pyonephrosis with only small remnants of parenchyma, tuberculosis, and new growths, especially carcinoma when diagnosed in the initial stage, and even then only when it is nearly certain that the other kidney is healthy. Woe to the physician who, after the sad results observed in Germany and other countries from removing a diseased kidney in cases where the insufficiency, or even absence, of the other kidney has been overlooked, does not listen to warning, and does not give up the idea of operation when the least doubt exists! We have already mentioned that for nephrectomy the less dangerous retro-peritoneal lumbar section is preferable to the transperitoneal method (objected to by *Schede*). This is especially the case in suppurative kidney, where the double incision of the peritoneum assists fatal subsequent infection (*von Bergmann, Angelini*), while for non-suppurating tumours the operation has as much claim to consideration as ovariotomy.

We will now return to our special treatment. For nephro-lithiasis and its sequelæ, usually renal suppuration, we are still in favour of *Czerny's* operative treatment.

Renal calculus becomes a surgical condition from the moment rational medical treatment proves ineffectual, and when life is in danger it is necessary to act promptly. Although *Gross* some years ago observed a mortality of 23 per cent. following nephrotomy in cases of pyonephrosis (44 per cent. following nephrectomy), the results, which daily improve in cases of renal calculus surgically treated, when it is practised according to rational indications, permit of considering the prognosis as favourable. This specially holds good for removal of the concretions, leaving the kidney as such intact (nephro and pyelolithotomy); numerous cases prove it (*Bardenheuer, von Bergmann, Czerny, Jacobson, I. Israël, Lange, Lauenstein, Thornton*, and others). By sounding, one has even been able to discover incarcerated calculi in the ureter. *Lauenstein* rightly calls attention to surgical exploration of the pelvis in cases where prolonged use of baths and other therapeutic measures have not improved the so-called "cystitis."

A few words remain to be said on the treatment of *renal colic*

itself. It seldom happens that one is able to employ *Simpson's* ingenious proposal to return the incarcerated stone to the pelvis renalis by placing the patient on his head and by using massage on the side affected. This procedure is as equally impracticable as *Simon's* for women, *i.e.*, to force the calculus back by sounding the ureter. *Reliquet* and *Bouchut* recommend pressure with gutta-percha bandage of the extremities, with the intention of increasing the arterial pressure in the trunk, and thus leading to additional excretory pressure in the kidneys. This procedure is not to our liking. In general, we are limited to the symptomatic treatment of the attacks. In cases with severe suffering one must not lose time by ordering derivatives, whatever may be their nature—no physician now prescribes cupping and emetics. In the first place recourse must be had to the plentiful administration of narcotics, and, specially if the patient vomits, to morphia subcutaneously, in the second place to chloroform and chloral.

In prolonged attacks, protracted lukewarm baths are of great use. During remissions various derivatives and cutaneous irritants, warm and cold applications, dry cupping, poultices, purgatives, etc., may be exhibited. It is needless to remind our readers that renal colic may cause death from uræmia, and that in these cases, if the diagnosis is made in time, surgical intervention may save the patient.

TUMOURS OF THE KIDNEYS.

After having treated the subject of renal tumours dependent on inflammation, we will now speak of hydronephrosis, hydatid tumours, and genuine new growths.

Hydronephrosis.

Hydrops renalis, cystonephrosis, cystic kidney, dropsical kidney.

The term "cystic kidney" (*Sackniere*) is very recent, and owes its origin to *Küster*, who includes under this head hydronephrosis and pyonephrosis, "as being inseparable." Although we by no means deny the fact that one of these diseases can proceed from the other, and *vice versâ*, and that *Küster's* theory on the formation of the cystic kidney holds good, yet we must own that this inseparability, in general holding good, for the surgeon often offers, with respect to genesis and important features of the clinical type, very considerable differences. We specially mention the cystic kidneys, which never in the slightest degree had to do with inflammation of the kidneys. Without further discussing the value of this collective denomination, we will treat separately on hydronephrosis in the real sense of the term, and refer to the part on "Pyelitis" for pyonephrosis.

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ETIOLOGY AND PATHOGENESIS.—Dilatation of the pelvis and the renal calyces is even observed in the first stage of life (*Henoch, Bidder*), and it is produced by obstructions to the free passage of urine in some part of the urinary tract (pelvis, ureter, bladder, urethra). This obstruction is sometimes caused by foreign bodies, sometimes by external pressure, sometimes by abnormalities of the walls. Hydronephrosis, generally unilateral, but sometimes bilateral, attacks equally the right or left side, and is in the majority of cases acquired, and not congenital. In the latter case, it becomes very important, and constitutes a serious obstacle to delivery.

Amongst the most important causes, one must remark:

1. *Nephrolithiasis*, which leads to obstruction of the ureter by the migration of calculi. In this case, hydronephrosis may have been caused by primary pyonephrosis (*Rayer, Simon*). In one of our cases of bilateral hydronephrosis without catarrh, calculous obstruction was unilateral.

2. *Inflammatory, tuberculous, carcinomatous conditions; multiple villous tumours* (*Neelsen*) and various excrescences of the walls of the pelvis and ureter; cicatricial stricture, consecutive to ulceration. For the forms produced by simple catarrhal pyelitis, *Küster* attributes the obstacle to a more or less complete obliteration of the superior orifice of the ureter, through inflammatory tumefaction of the mucous membrane. This, at first only relative hindrance, increases through pressure of the movable mucous membrane of the pelvis against the opening of the ureter and through formation of valvular folds. This opinion is plausible, and is not without an experimental basis, but it is not always applicable, as cases are often met with where it is possible to empty a pyonephrosis by pressure on the tumour. Thus, *I. Israël* substitutes a dynamic explanation for *Küster's* mechanical view. This explanation is based on the action of protracted inflammation on the muscular elastic walls of the pelvis and calyces, thus rendering them unable to get rid of the urine. It frequently happens, however, that cystic kidneys completely empty themselves of their contents, which, as *Küster* rightly remarks, would be impossible if musculo-elastic power were the only expulsory factor. Nevertheless, it cannot be doubted that this insufficiency plays an important part.

3. *Dislocation and compression from without* of various tumours which surround it or press against it, as well as the inflammatory processes which constrict by means of atrophy. Specially worthy of notice are renal tumours, pararenal abscesses, vesical tumours, sacculation calculi, which close the orifice of the ureter. The frequency of this affection in women is due to ovarian tumours, new growths (*Pozzi*), displacements (*Hildebrand*) of the uterus, pregnancy, parametritis.

Virchow showed that the prolapse of the womb, the importance

of which has been noted by *Phillippi*, *Fére*, and others, may press the inferior segment of the ureter against the pubic arch, and compress it by contraction.

To these various causes must be added an etiological factor to which *Virchow* attributes the most extensive hydronephrosis, viz., an anomaly of the superior aperture of the ureter, which enters the renal pelvis at an acute angle. In this case, in the upright position, the dilatation itself of the pelvis exaggerates the obstacle by pressing upon the portion of the ureter adjoining the walls of the pelvis; in the horizontal position, on the contrary, the urine flows freely.

In certain cases it may be asserted, without fear of making a mistake, that these abnormal insertions of the ureter, with valvular formations, are to be traced to congenital disturbances of development. Another series of equally numerous cases *Simon* connects with acquired conditions, as for example the dilatation of the pelvis, previously produced by some obstacle (calculus) in the ureter, which thus, through its dilatation, has caused inflection under a sharp angle of the ureter in the region of its pelvic attachment. According to this, the oblique insertion of the ureter must be considered more as a consequence than a cause of hydronephrosis, an opinion with which *Küster* and *Israël* are inclined to agree. The latter, like *Simon*, attributes this result to a greater downward expansion of the pelvis, which displaces the opening of the ureter, leading to an increase of the acuteness of the angle of insertion upwards, so that the liquid in the pelvis obstructs by its own pressure the channel which ought to allow it to flow away.

A short time ago *Hansemann*, on the strength of a certain number of personal observations, gave the detailed analysis of a particular kind of valvular obstruction, said to be due to the fact that the equally balanced tension in the hydronephrotic sac is transformed by the anatomical position and nature of the kidney into a lateral tension.

Finally, inflections in the course of the ureter must be taken into consideration, whether they are the result of anomalies of development or of cicatricial adhesion, or even, as *Landau* remarked, produced by floating kidney.* While the floating

* *Stanmore Bishop*, "Case of Nephrectomy for Cystic Kidney—Recovery:" *Lancet*, vol. i., 1895.—"This case is one of hydronephrosis, probably due to a kink in the ureter. The changes induced in the renal tissue made it necessary that the cyst should be excised, and not simply incised and drained. Such a procedure, although still recommended in similar cases by some of our text-books, would have been quite useless where the disease was so advanced as in this instance. There is little doubt that the diminished mortality after nephrectomy, especially nephrectomy as performed through a lumbar incision, has much to do with the greater boldness now displayed in attacking such a diseased organ. This disease of the kidney is one in which the lumbar operation is especially indicated, and the mortality should not much exceed that which follows ovariotomy at the

kidney descends, the fixed ureter remains in loco. Hence the acute angle of insertion of the ureter, to which *Cohnheim* has already drawn attention, and the alternation of obstruction and

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present day, as compared with that given by *Newman* (30·5 per cent.) and that by *Gross* (36·93 per cent.) for all cases of nephrectomy by this route.

"The patient, a single woman, aged twenty-one years, was sent to Ancoats Hospital by *Dr. William Armstrong*, of Buxton, on February 12, 1895, complaining of a tumour in the right side of the abdomen. Her family history was good. There was no history of carcinoma or tubercle. Her catamenia had always been regular, very little being lost. They commenced when she was eighteen years old. There was some little premenstrual pain. Two years ago she first noticed some swelling, mainly after taking food. There was also aching pain in the anterior axillary line, midway between the ribs and ilium. The swelling diminished a good deal from time to time, but never entirely disappeared. When the aching pain came on—about once in three months—she had to go to bed and be poulticed, which relieved her. These attacks were becoming more frequent. She had had three bilious attacks, vomiting bile, coincidentally with the pain. There was never any œdema of the legs or jaundice. She had always passed urine freely, and had noticed no deposit in it until very recently. She remembered no accident. Her work had always been light. The measurements were as follows: Circumference at the level of the tip of the sternum, 29½ inches; the same at the umbilicus, 33 inches; the same midway between the above, 28½ inches; half-circumference at the level of the umbilicus, left, 16 inches; right, 15¾ inches. The tumour, which was easily seen and felt, lay in the right lumbar region, extending as far forward as the umbilicus, with a clear percussion note between it and the liver dulness. Percussion was dull over it. Its longest diameter, which was transverse, was 9½ inches; its widest vertical diameter at its anterior edge was 5 inches, diminishing gradually to 3 inches behind. The surfaces were smooth, elastic, and rounded. No notch was to be felt. There was no pain on palpation and no sensation of nausea. The tumour moved with respiration, and, whilst immovable to any extent upwards or downwards by external pressure, had fair lateral movement. It could not, however, be displaced backwards into the renal region. The urine contained a small quantity of blood and pus, recognised by the microscope and the guaiacum test. Recto-abdominal examination showed that the tumour did not spring from any pelvic organ. The diagnosis appeared to lie between greatly-enlarged gall-bladder and omental and renal tumours. On February 22, *Dr. Armstrong* being present, an exploratory incision (*Langenbuch's*), was made over the tumour. It was found to be beneath the peritoneum, the ascending colon being pushed over to the left side, the omentum drawn up, and the tumour, covered by peritoneum, presenting at the opening. The peritoneum was closed, and the patient turned over on to the left side. A second diagonal incision, 6 inches long, was made at the junction of the upper and middle thirds of the loin. After the muscles had been divided, the tumour, dark chocolate in colour and very tense, presented. It was separated all round by the finger and scissors, the perirenal fat being all absorbed. When free, and pushed outwards by the assistant's hand over the abdomen, a small opening was made, and a straw-coloured fluid gushed out. About a third was lost, but 36 ounces were collected, being of specific gravity 1002. It was neutral, and contained albumin and chlorides, with small amounts of blood and pus, but no crystals or epithelium. The tumour collapsed, and was easily drawn out. The ureter appeared to spring from the lower extremity of the tumour, and in its then position lay partly curved over the lower third of the tumour. It was not dilated. It was separately tied with a silk ligature. Another ligature was placed around the vessels, and the tumour cut away at a short distance. Several small vessels still bled in the walls, and were tied separately. A large drainage-tube was placed in the cavity beneath the diaphragm. The action of this muscle produced a great deal of pumping in and out of air, this being drawn into the loose folds of connective tissue and

flow of the urine. This theory is easily explained by the increased amount of urine in the segment of the ureter situated above the flexion. This segment comes in line with the lower segment, and after the greater part of the urine has passed, the old flexion returns. Later on the importance of this phenomenon will be apparent. Quite recently, in a case of moderate hydronephrosis, we remarked a very pronounced S-shaped incurvation of the ureter near the pelvic inlet, and stenosis of the lumen by preceding inflammation of the ureter. In this case, certainly, the pelvis had been saved from excessive dilatation by the fixation of the whole affected segment.

4. *Strictures of the urethra*, with their various causes (hypertrophy of the prostate, gleet). In these cases the bladder evidently shares in the dilatation. To the congenital forms of hydronephrosis the following must be added: Stenosis of the vesical orifice of the ureter (*Steiner*); abnormal course of the renal artery winding round the ureter (*Rokitansky*, *Boogard*); the passage of the ureter through the muscular prostatic gland and opening into the veru montanum, and other anatomical rarities; hypertrophy

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expelled with some force. A small opening into the peritoneum was closed by catgut. The exterior of the ascending colon could be seen. The muscular layers of both incisions, and especially the fascia, were united by buried silkworm gut sutures, and the skin by horsehair. Both were dressed with iodoform gauze and covered by wood-wool, and a flannel bandage was tightly applied. The operation, which was done on a hot-water table, lasted one hour and a quarter. The patient bore it well, and left the table with a good, full pulse—viz., 108—respiration 32, and temperature 96° F. A nutrient enema with brandy was given directly after the operation, and repeated every six hours. A catheter passed four hours after the operation removed 13 ounces of clear urine. Collapse came on about one hour after the operation, and lasted for about an hour. About eight hours after the operation she complained of great pain under the diaphragm on the right side, but was relieved by 4 minims of the hypodermic solution of morphia. There was some nausea during the night, but no vomiting. At 6 p.m. the temperature was 97°, the pulse 98, and the respiration 28. A catheter was passed every eight hours. At 1 a.m. on the 23rd, 3 ounces of urine were withdrawn, at 9 a.m. 6 ounces, and at 5 p.m. 6 ounces, and so on. The urine became loaded with urates after the first evacuation. On the next day (the 23rd) a teaspoonful of hot water was given every hour from 10 a.m. At 1.30 p.m., there being no sickness, ½ ounce of milk and soda-water was given, and at 5.30 p.m. ½ ounce of beef-tea. On the 24th an enema had a slight result. On the 25th a punctiform rash, resembling measles, showed itself on the chest and legs, but there were no coryza or bronchitic symptoms. The urine was slightly alkaline. On the 27th, although no discharge showed itself outside the dressing, there being a slight sour smell, the dressings were changed, and the large tube was replaced by one of smaller calibre. There was some puriform discharge. The amount of urine on this day was 32 ounces, and alkaline. On the 28th it was 25 ounces, and on March 1 59½ ounces. The rash had gone. On the 2nd the patient passed urine naturally for the first time. On the 3rd the urine was clear and acid, and of specific gravity 1020. On the 5th the stitches were removed from the wounds. The anterior wound was perfectly healed. The drainage-tube in the posterior wound was pushed outside and was not replaced. From this time the patient's progress was uneventful."—W. H. G.

of the veru montanum (*Rindfleisch*); atresia of the urethra (*Englisch*); congenital phimosis (*W. Müller*), etc.

In a fairly large number of cases, a good many of which have come under our observation, the etiology of hydronephrosis remains obscure; *à priori* views of obstruction have sometimes, in spite of most careful post-mortem investigation, not been confirmed.

Regarding the *mode of development* of the affection, *Cohnheim* believes that marked hydronephrosis is produced, not by rapid total obstruction, but by *slow* progressive obliterations, the effect of which is not complete, but which alternates in consequence with periods of freedom. Complete experimental ligature of the ureter leads only to moderate dilatation of the pelvis, with comparatively rapid cessation of urinary excretion, besides certain nephritic changes, as lately observed by *Holste*. Under such circumstances, complete and permanent cessation of urinary excretion does not take place; on the contrary, after a more or less prolonged interruption, and when increasing extension has overcome the obstacle, the kidney is able to furnish the pelvis with considerable quantities of urine. Hence the enormous dilatation of the same in the course of time.

This opinion is corroborated by an experiment to which we will refer later when speaking of "intermittent" cystic kidney. When the ureter is loosely ligatured, a proceeding which gradually leads to atrophy by constriction, hydronephrosis is much more marked than in cases of total obstruction of the ureter (*Cohnheim*).

Secretion of the pelvic mucus, which even now certain authors consider sometimes as an essential factor in the causation of hydronephrotic dilatation, plays, if any, but a subordinate part.

Pathological Anatomy.—The injurious effects of dilatation of the pelvis first make themselves noticeable in the pyramids; flattening of the papillæ occurs subsequently, and, as *Friedreich* has shown, the papillæ sometimes undergo necrosis and desquamation. Later on the cortex wastes, and the kidney is to be found literally compressed against the capsule of the tumour.

The structure of the parenchyma is to a great extent the same as that of the atrophied kidney. Its nephritic character, particularly studied by *Artaud*, cannot be attributed to purely mechanical factors, for in cases where the ligature of the ureter was quite aseptic, *Straus* and *Germont* did not witness any inflammatory lesions. Finally, a cyst the size of a man's head may develop, containing as much as 20 to 30 litres of fluid (*Frank*, *Dumreicher*, *Zielewicz*), and in the walls of which the microscope reveals residues of parenchyma, renal canaliculi, and glomeruli. The calyces occupy the capsule of the cyst in the shape of deep isolated depressions, or they form pouches communicating with the principal cavity by tubular channels. In a case observed by *W. Müller*, both kidneys were transformed into

cysts the size of a man's head; the parenchyma had almost entirely disappeared. On one side the ureter was completely blocked by a calculus, whilst on the other some movable concretions existed.

The contents of the cyst, apart from permanent pyonephrosis, are nearly always clear, light yellow, aqueous, seldom gelatinous, or coloured by bland pigment. As long as the flow is not interrupted, the fluid preserves to a great extent the character of urine, and contains urea and uric acid. The absence of these latter constituents proves that renal functions have ceased.

Mucus (renal pelvic excretion) and albumin are usually found in hydronephrotic fluid. Microscopical examination often shows epithelium, sometimes lamellæ of cholesterine, and, in cases of hæmorrhagic complication or secondary inflammation, numerous blood corpuscles and leucocytes, as well as a large proportion of albumin. Such cases constitute transition stages towards pyonephrosis. In one case *Kehrer* found gas in the cystic contents (principally carbonic acid) without any communication existing with the intestines or putrefaction being present.

When the obstacle lies in the pelvic end of the ureter, the ureter appears contracted below and dilated above, and is generally incurvated, while its lumen may attain to the size of the small intestine.*

Great care at the necropsy is necessary to determine the nature of the obstacle; above all, compression by cicatrization, kinking of the ureter, etc., must be looked for, and that before displacing the urinary organs. The causal factors may sometimes only be made out under special conditions, and the anatomical explanation may be impossible. In marked hydronephrosis, a ureter of normal size is sometimes met with, which in pressing the tumour allows the urine to pass freely (as happened, amongst others, to *A. Wehenkel* and ourselves); or slight narrowing of the lower part of the urinary passage only may be found at the necropsy (*Schuchardt*). In some cases the cause of obstruction cannot be made out at all.

Adhesions of the hydronephrotic sac with the neighbouring parts are the rule. When, as is usually the case, hydronephrosis

* *Ralfe*, "Diseases of the Kidneys":—"When the obstruction at first is slight and only gradually increases, no great dilatation may ensue, and may proceed, supposing the obstruction never becomes quite complete, no further than to atrophy of the medullary substance. Even then, if complete obstruction sets in, and the kidney structure is absolutely wasted, the hydronephrosis never attains considerable dimensions, because the destruction of the secreting structure has gone hand-in-hand with the obstruction. It is sudden and complete obstruction that leads to large hydronephrotic tumours. The fluid of hydronephrosis is of low specific gravity (1004), with a neutral or slightly acid reaction, never alkaline unless it has been kept; it generally contains traces of urea and uric acid, though these may be absent. It does not contain albumin, though *Dr. Schetelig*, of Hamburg, has found par-albumin in the fluid of a hydronephrosis; cholesterine has also been found. The fluid contains an abundance of sodium chloride."—W. H. G.

is unilateral, the healthy organ becomes hypertrophied, and in cases of pyonephrosis shows a decided tendency to become sympathetically affected.

For details regarding concomitant cardiac hypertrophy, see the following section.

SYMPTOMS.—Fever and pain are not clinical features of hydronephrosis, and therefore it is not astonishing to find that, in a considerable number of cases, the first and only symptom is the presence of a large fluctuating tumour in the abdomen. The clinical picture is modified by the accompanying or preceding nephrolithiasis, stricture of the urethra, carcinoma of the uterus, and other important primary conditions.

The state of the urine is of great interest, but it is not always of great practical value. In the first place, it will be noticed that in many cases the urine is normal as far as quantity and quality are concerned, especially when the communication between a hydronephrotic kidney and the bladder is completely and permanently cut off, the other kidney remaining healthy. The latter then acts by compensation. Pus in the urine points to such conditions as pyelitis, pyelonephritis, etc. In our cases, as well as in *Landau's*, the urine was usually clear, at the most merely containing some casts, and this holds good even for the period during which the urine passed freely from the affected tissues.

Complete bilateral obstruction naturally determines a complete anuria, which, if the obstruction is not removed, is followed by uræmia. Incomplete or transitory obstruction of the ureter leads to the presence of mucus in the urine, and when complicated with inflammation, pus and blood are also found. In a case of double hydronephrosis with serious nephritis, which produced intermittent attacks of anuria and uræmia, we observed a considerable quantity of blood in the urine. This fact, together with an erroneous diagnosis between right-sided hydronephrosis and hypertrophy of the liver, caused the patient to be sent to us as suffering from paroxysmal hæmoglobinuria. We ourselves diagnosed Bright's disease, and only at the necropsy was the true lesion revealed. *Rosenstein* has seen a similar case.

Large closed fixed hydronephrotic sacs produce, as long as the other kidney is healthy, no other symptom than a large tumour in the abdomen. But in cases of unilateral or bilateral hydronephrosis with periodical complete obstruction of the ureter, the clinical picture is most characteristic. Attenuating periods of *oliguria*, *anuria*, and *polyuria* are then observed at intervals, determined by the necessary duration and accumulation of a quantity of fluid, sufficient to overcome the obstruction. Cases of this kind were already known to *Tulpius* (1672) and *Sauvages*. Numerous instances have been recorded recently by *Wilse*, *Cole*, *Morris*, *Hare*, *Eger*, *E. Fränkel*, *Israël*, *Kappe*, by us, and espe-

cially by *Landau*, under the name of *intermittent hydronephrosis*. In these cases the patients experience a relative feeling of comfort when the ureter is free; periods of obstruction, on the contrary, are marked by violent attacks of local pain, vomiting, rigor, and colic. These attacks are generally produced by pressure of the tumour, which is enlarged during the period of anuria, and may even sometimes be of a uræmic nature.

Usually the *cause* of the obstruction is not obvious; it is often explained, as *Landau* and we have noticed, by the peculiar horizontal positions assumed by the patient. *Israël* relates a case due to inflation after partaking of effervescing drinks (carbonic acid) and flatulent food. The relieving flow of urine does not only depend on the quantity of fluid contained in the sac, but is generally followed by genuine polyuria, due to the sudden relief of the glomeruli by removal of the obstacle; in a certain number of cases it is also dependent on the accompanying hypertrophy of the left ventricle. It is a curious fact that, in spite of the incontrovertible proof supplied by *Friedreich* and *Cohnheim*, text-books hardly mention this complication.

The necessary conditions are, according to *Cohnheim*, marked obstruction to the renal circulation, combined with a not too unfavourable state of the nutrition. These conditions are found in renal atrophy from hydronephrosis. When inflammation of the urinary passages occurs with ascending nephritis, which in itself often produces cardiac complication, as *Weill* and *Artaud* have proved, it is sometimes impossible to distinguish how much of the atrophy of the parenchyma is due to renal inflammation, and how much to mechanical factors. Large hydronephrotic tumours naturally lead to displacement of the neighbouring organs, and are often of great importance for diagnosis. It must be borne in mind that *left-sided* hydronephrosis pushes the lungs and spleen in an upward direction, the heart towards the median line, and the stomach and transverse colon to the right. *Right-sided* hydronephrosis, on the other hand, pushes the liver forwards and to the left, the transverse colon downwards, and leads to a vertical position of the stomach. In both cases the ascending and descending colon is displaced towards the median line. Marked bilateral hydronephrosis presses upon the aforementioned portions of the intestine from both sides. The position of the colon in front of the tumour has a certain importance, for in that case fluctuation sometimes occurs, but it may be absent.

The progress of development of large hydronephrotic tumours gives rise to a painful sensation of fulness in the abdomen, to dyspnœa (pressure on the lungs), dyspepsia and digestive disturbances (pressure on the stomach and intestines).

It is curious to observe that sometimes the tumour remains stationary for years, and that at others it rapidly increases in size without any apparent cause. *Taylor* records an instance of

a cyst of the kidney developing in the space of a week, and endangering the life of the patient by rupture.

Traumatic hæmaturia often results. Ruptures, when spontaneous (*Dittel*), and even when recurring, are not always proved to be fatal, provided the hydronephrotic fluid does not contain blood or pus. In the latter case, fatal peritonitis is inevitable.

When atrophy of the parenchyma of the affected kidney has reached its attainable limit, and when the other kidney has also become inefficient, either from cystonephritis or as a result of nephritic or sympathetic disease, uræmia usually occurs without excretion of the latter kidney being in any way obstructed.

These disturbances may be acute or chronic; the latter are especially observed, according to *Gauchet* and *Ebstein*, in cases of uterine carcinoma with progressive oliguria. Nevertheless, it is precisely in these cases that we have observed, almost up to the last, persistent polyuria, probably due to pyelitis, and finally cardiac hypertrophy, which is nearly always present when the nutrition is fair. These cases can hardly be considered uræmic.

When hydronephrosis is complicated with suppuration, we have the aforementioned symptoms of pyonephrosis. Recently we have observed a genuine intermittent hæmatonephrosis in consequence of periodical obstruction by renal calculus.

The duration of the affection depends on the original disease, the nature of the obstruction, and the treatment.

Prognosis is usually difficult. Very frequently the patients live for years with enormous tumours without marked discomfort or weakness. Two of our patients with typical intermittent hydronephrosis consulted us for trivial complaints apart from the kidney condition.

Diagnosis.—Slight cases usually escape clinical observation. The diagnosis is very difficult, even in well-developed forms, the intermittent types excepted. In female patients it is of the greatest importance to distinguish hydronephrosis from an *ovarian cyst*. Serious errors have been committed by even experienced practitioners, leading to unpleasant consequences.

Preceding symptoms of renal affections, such as nephrolithiasis, renal colic, pyelitis, are of the greatest importance, especially when these conditions have been associated with localized pain. With respect to the tumour itself, increase and decrease of its circumference, together with the modifications in the quantity of urine, point to the existence of hydronephrosis. Unfortunately, these changes are not always open to proof.

The displacement of the colon already referred to is usually a valuable sign (*Spencer Wells*), but not absolutely decisive, because on the one hand ovarian cysts may be in front of the intestines, and on the other the intestines are not always displaced anteriorly to the hydronephrosis. Sometimes the colon is empty, and consequently cannot be made out by percussion. It can be felt as a

kind of ligament. In doubtful cases *Wells* recommended inflation of the intestines with air, but this only leads to results when the effects of pressure have been removed by emptying the tumour. *Simon* has seen good results from intestinal irrigation.

Ovarian tumours develop in the true pelvis in an upward, hydronephrosis from the lumbar region in a downward, direction. When the tumour is of moderate size its point of origin may be made out from the vagina; in other cases diagnosis may be assisted by *Simon's* manual examination per rectum.

Examination of the contents of the cyst obtained by exploratary puncture is of great importance, and often decisive. Nevertheless, it must be borne in mind that puncture of hydronephrotic cyst is, in spite of every precaution, usually accompanied by inflammation, suppuration, and peritonitis.

This latter complication possibly occurs because the cystic contents have a great tendency to transude. Therefore extra-peritoneal exploration should be made if possible.

The presence of urinary elements in the fluid, notably of large quantities of urea (up to 0·5 per cent.) and of uric acid, its acid reaction (*Salomon*)—negative results naturally prove nothing—together with the absence, or an insignificant amount, of albumin, are in favour of hydronephrosis. It must not, however, be forgotten that in some cases ovarian cysts communicate with the urinary passages.

The colloid character of the fluid, the presence of metalbumin and of paralbumin, are only of secondary importance (*Esmarch*). Cylindrical epithelium indicates an ovarian cyst; pavement epithelium, hydronephrosis (*Spiegelberg*); but this is insufficient *alone* for diagnosis. Expression of the contents of the tumour by way of the ureter into the bladder is seldom successful.

Whenever the most exact interpretation of the symptoms does not give the practitioner the key to differential diagnosis, it may be obtained by the presence of renal calyces on the inner side of the cyst after it has been emptied by incision (*Simon*). This procedure may be of great practical value for those who have excision of the organ in view.

For details of the differential diagnosis of renal carcinoma and hydatid cyst, we refer our readers to the following section.

In a valuable lecture on "Palpation of Sound and Diseased Kidneys" (*Berliner Klin. Wochenschrift*, 1889) *I. Israël* draws attention to the fact how seldom it is possible to make out the sound kidney by means of bimanual palpation, "ballottement rénal." His examinations on the living subject have often put him in a position to prove that the slightly, if at all, enlarged viscus may cause respiratory movement to the extent of an inch.

These observations are very important, but are much influenced by chloroform anæsthesia.

The presence of the hydatid fremitus in cases of echinococcus

of the kidney, and the sensation of friction when several calculi exist, *Israël* considers as belonging to "most exceptional causes."

Récamier, on the other hand, declares, in his thesis (Paris, 1889) "Étude sur les Rapports du Rein et son Exploration Chirurgicale" (seventy-six cases), that he has only once, under especially favourable circumstances, felt a sound kidney (according to our experience, very remarkable), and he has found no advantage from the use of *Israël's* method of palpation in the lateral position over bimanual exploration from the front, over the ballottement and the "nephroleptic" method of *Glénard* (palpation of the kidney with thumb and middle finger of the hand from the flank). *Récamier* attributes considerable value to direct palpation of the organ after abdominal section for ascertaining the size and consistency of the second kidney. He warns against procrastination.

Glénard gives a full description of his nephroleptic method of kidney palpation in a publication on abdominal examination. The practitioner has probably instinctively used the principle of this procedure, even if he has not kept strictly to *Glénard's* rules, "Affût, capture, échappement."

Our own numerous experiments have only served to confirm our opinion that an absolute superiority of one method over another does not exist, but that according to the circumstances one or the other method may be applied. The chief thing is the use of physical methods of examination at our command, naturally exclusive of exploratory incisions, the efficacy of which is beyond question. *Schede* has recently described the value of the same in the form of the *Bardenheuer* exploratory incision down to the peritoneum, in his valuable "Erfahrungen über Nierenextirpation." According to this experienced surgeon, the theory that a *positive* diagnosis is necessary before even thinking of an operation is erroneous. A diagnosis pointing to surgical interference can generally be made by exclusion. Regarding the question of the soundness of the other kidney, *Schede* considers *Pawlik's* ureter catheterism too difficult to carry out, as many cases are complicated with cystitis, and that *Tuchmann's* and *Fenwick's* methods are practically out of the question. The opinion of these authorities is much the same as our own. *Schede* attaches weight to *Kühne's* opinion that hæmorrhages, which in the case of kidney tumours proceed from the *sound* kidney or its overfilled and ruptured capillaries, may occur with an obstructed ureter. Regarding the differential diagnosis of *hydronephrosis* and ovarian cysts, we are not able to agree with the theory that the former "always," and the latter "never," has the *colon* in front of it, even in cases of floating and horseshoe kidney. If on rectal examination the uterus is found to be freely movable when separated from the tumour, or when both ovaries can be felt, neither an ovarian tumour nor an intraligamentary cyst can, according to

Schede, exist; while a renal cyst is impossible when a pedicle extending from the uterus to the tumour can be distinctly felt, or when the tumour cannot be separated from the side of the uterus.

It is sometimes difficult to differentiate hydronephrosis from *hepatic tumour;* in fact, experience has taught us that it is one of the least successful tasks to establish a differential diagnosis between renal tumours, hepatic tumours, or tumours of the *gall-bladder*, when the characteristic symptoms are wanting, which often happens. For this reason we intend giving a short résumé of the facts which enable us to make a diagnosis.

It has been said, and many authors are still of that opinion, that renal tumours, contrary to those of the liver, are never influenced by respiration. This opinion is out of date. We know that renal tumours, even large ones, may show very pronounced respiratory movement, and are in this respect in no way, as we have already remarked, different from hepatic tumours. A sure rule is that, on the left side at least (where the diaphragm cannot communicate its movements by means of the liver), the renal tumour does not manifest synchronous movements. *Israël* rightly remarks that, in a lateral position of the body towards the left, the contact between the liver and the kidney may be interrupted in such a manner that the hand may, even under anæsthesia—which is always indicated when there is straining of the abdomen—not be able to distinguish the two organs. In cases of hydronephrosis, however, this fact appears valueless, in consequence of adhesions which are nearly always present. This also renders *Minkowski's* advice impracticable—that is, to leave the tumour in the position which it occupies during inspiration, so that at the moment of expiration the liver and the diaphragm only are seen to rise. *Israël* regards *Guyon's renal "ballottement"* as "almost pathognomonic" in the case of renal tumour. This ballottement is nothing more than the sensation of the shock when the organ strikes against the anterior abdominal wall, to which the palpating hand is applied—a sensation determined by gentle percussion of the lumbar region. It is possibly a coincidence that we have lately observed this phenomenon in cases of hepatic tumours which were markedly developed towards the lumbar region. This was particularly noticeable in a woman suffering from cancer of the liver, from the moment paracentesis had been performed. These exceptions do not invalidate the superiority of this sign over ordinary palpation.

Finally, the fact was formerly considered an axiom, and is even now by some authors, that hepatic tumour is applied to the abdominal wall, while the renal tumour is separated from it by the colon. Our personal experience obliges us to regard these facts as the rule, and we cannot agree with *Guillet*, who states that in the majority of cases the ascending colon does not cover the kidney on the right side. In spite of this, we do not deny

[illegible]

[illegible] present [illegible] the necessary [illegible] the [illegible] depend on the skill [illegible] It is hardly necessary to add that, as in the [illegible] described, this one is far from furnishing [illegible] There are cases where the results seem com- [illegible] of the other diagnosis, and in which laparo- [illegible] the key to the problem ; still, conclusions must not be hurriedly arrived at. In a case already mentioned, the "hepatic tumour" was taken at the commencement of the post-mortem examination for a tumour of the gall-bladder, and it was only after tedious enucleation of what in reality was a hydro-nephrotic tumour that the gall-bladder was found between cicatricial adhesion and the liver. What we have just said of

the right side holds good, *mutatis mutandis*, for the left side and the spleen. Errors between splenic and renal tumours are far from being exceptional (see "Renal Cancer" and "Floating Kidney").

We have already remarked that fluctuation may be present in hydronephrosis; therefore we do not understand *Landau's* statement that he has never met with this sign. Nevertheless, we have more frequently met with hydronephrosis of the resistant type so much insisted on by *Landau* and *Guttmann*, than with fluctuating cysts, which *Küster* considers as nearly constant. Fluctuation is generally absent when the tumour is greatly distended, and, according to *Israël*, when the capsule is rigid and thickened; finally, when the septa between the dilated calyces are hypertrophied, according to *Stiller*, numerous small evacuations exist, such as are more frequently met with in pyonephrosis than in hydronephrosis (notably in the cystic kidney).

It is hardly possible to mistake bilateral hydronephrosis for *ascites*, owing to the modifications in the area of dulness by change of position of the body.

PROGNOSIS.—As will be easily seen from the preceding remarks, prognosis is always doubtful, although the progress of modern surgery renders it each year more favourable. *Küster's* statistics must be considered as remarkable. Out of thirteen cases of hydronephrosis he obtained eight complete recoveries, and he only lost two patients. *Brodeur* was successful, thanks to the operation, in nineteen cases out of thirty-two. Spontaneous recovery naturally combined with defect, through removal of the obstruction (calculus, internal flexions, etc.), is very rare. *Landau* considers that pregnancy exercised a favourable influence by forcing the kidney upwards.

It is evident that the prognosis is still subordinate to the causal disease (especially cancer). As we have already remarked, the other kidney may be attacked sympathetically in cases of unilateral hydronephrosis.

Repeated exploratory punctures, especially when employed transperitoneally, may, even with strict antiseptic treatment, become very dangerous by inflammation and ulceration of the sac, leading to septicæmia or peritonitis.

The congenital form usually leads to a fatal result in children, if they be not stillborn, shortly after birth. It is generally accompanied by symptoms of dyspnœa. Nevertheless, *Baum* mentions a case which recovered in the second year, and the child lived to grow up.

TREATMENT.—In moderate hydronephrosis, without special disturbances and in those cases which accompany carcinoma, it is best not to interfere. In a certain number of cases, attention to prophylactic and causal indications must suffice, by rational treatment of the urethral stricture, of renal and vesical calculus, of

PATHOLOGICAL ANATOMY.—As a rule, one kidney only is affected.* The development of the cysts commences from the cortex and from the medullary substance; its development is always accompanied by atrophy of the renal tissue, due to compression. When the cyst attains a great size (the size of a human head), the entire organ may appear to be destroyed.

The cysts have a marked tendency to perforation, especially towards the renal pelvis. They are usually connected with their surroundings by extensive peritoneal adhesions.

The mother cyst, formed by concentric layers of gelatinous, semi-transparent substance derived from the connective tissue of the organ which harbours the echinoccocus, contains numerous daughter and grand-daughter cysts, even to the fourth generation. For details concerning the structure and characters of the scolices, hooklets, etc., works on general pathology must be consulted.

The *fluid*, clear as water and of a neutral reaction, wherein the daughter cysts float, contains very little or no albumin, if the vesicle has not been punctured; it is very rich in chloride of sodium, and has a specific gravity of 1008 to 1013. Amongst other substances, succinic acid, uric acid, oxalate of lime, triple phosphate, inosite, cholesterine, hæmatoidin are also found. At the death of the parasite the cyst becomes atrophied, and its contents become changed into a cheesy, chalky mass, containing the remains of the membranes and hooklets (Fig. 4).

SYMPTOMS.—The tumours may attain to a considerable size without causing any disturbances, thanks to the compensation on the part of the other kidney. In extreme degrees, the compression caused by the development of the cyst leads to symptoms similar to those caused by hydronephrosis. The tumour is spheroidal, and often fluctuates, but the "hydatid fremitus" is seldom observed. Inflammation (suppuration) or rupture of the cyst often occurs suddenly after a blow, or straining, or prolonged exertion. There is a tendency for the cyst to burst and discharge its contents into the pelvis of the kidney. It thus happens that the vesicles lead to obstruction of the ureter, and cause attacks resembling renal colic. When the vesicles have once successfully traversed the ureter—months may pass before their migration has been fully concluded—they may cause fresh suffering to the patient by becoming impacted at the entrance into the urethra, and thus occasion the most painful strangury or anuria. Hydatids which have passed through the urethra, sometimes with explosive sounds, may be found in great numbers in the urine. Women sometimes remove them from the urethra with the fingers.

When the tumour has burst and discharged its contents,

amongst the poorer classes. Statistics show that in Iceland something like 14·3 per cent. of the inhabitants die of hydatid disease of some organ or other.—W. H. G.

* The left kidney is said to be the one most frequently affected.—W. H. G.

complete shrinking of the echinococcal cyst may ensue; in other cases vesicles may pass at irregular intervals for years, sometimes accompanied with pyuria, resulting from a catarrhal condition of the renal pelvis. Hæmaturia is of fairly frequent occurrence.

Simultaneous rupture of the cyst into the pelvis of the kidney and into the bronchi has been twice observed; both cases proved fatal. On the other hand, no instance is recorded of rupture into the abdominal cavity. The cases of rupture into the intestines, externally through the lumbar parietes, cannot be considered

FIG. 4.—MEMBRANES AND HOOKLETS OF ECHINOCOCCI.

as conclusive as far as the primary seat of the disease is concerned.

Pyæmic symptoms may follow extensive suppuration of the cysts. Finally, rupture of the kidney, without that of the cyst, may cause death (*Lapersonne*).

It is not necessary to point out that the echinococcus may sometimes become attached to a floating kidney.

DIAGNOSIS.—A cystic tumour forming part of the kidney may be regarded as a hydatid cyst when the urine contains characteristic vesicles, laminated membranes or hooklets, accompanied by a proportional diminution in the size of the tumour. The simple expulsion of vesicles with the urine may ensue from perforation of hydatid of other organs into the urinary passages (*Ebstein*). In

doubtful cases, exploratory puncture decides the point, if concentric stratified hydatid membranes or hooklets are found, or if the liquid contains no albumin. The presence of albumin does not, however, exclude this affection.

The absence of general symptoms and the state of the urine in hydatid of the kidney are of great assistance in diagnosis.

For the differential diagnosis from ovarian cysts and other tumours, see section on "Hydronephrosis."

PROGNOSIS.—Rupture of the cyst into the renal pelvis is not a very dangerous occurrence; on the contrary, it often leads to recovery. Prognosis becomes serious when the rupture takes place in the direction of other organs, and when the cyst suppurates or becomes very large in size. Patients have lived for years with hydatid cysts.

TREATMENT.—We cannot in this place enter into the important question of prophylaxis. It is the same as that for hydatid disease in general.*

Internal remedies have, much as they may be recommended, absolutely no effect on a tumour already formed. As to *operative treatment* we can only repeat here what has been said in the case of hydronephrosis, with this difference, that puncture and incision of the cyst must only be carried out after suturing it to the abdominal parietes. *Imlach*, who took a renal hydatid cyst adhering to the uterus for a cystic tumour of the latter viscus, obtained a cure after laparotomy. He emptied the cyst and sutured it to the abdominal wound. *Knie* successfully removed a cyst, together with what remained of the kidney.

Renal colic produced by the ureter becoming blocked with vesicles must be treated symptomatically. Retention of urine through obstruction of the urethra calls for the use of the catheter, the foreign bodies often appearing in the eye of the instrument.

Other parasites of the kidneys, such as *Strongylus gigas* and *Pentastoma denticulatum*, offer but little clinical interest.† *Distoma Hæmatobium* is only met with in the tropics. We have already mentioned the probable connection of *rhabditis* with hæmoglobinuria; *Peiper* and *Westphal* observed hæmaturia under similar circumstances, but the origin of the parasites remained obscure.

* *Ralfe*, "Diseases of the Kidney."—"To prevent the extension of the disease in districts where it has become rife, the following rules laid down by *Murchison* should be followed: (*a*) To prevent dogs feeding on the offal of sheep and other animals infected with hydatids. Dogs ought to be rigidly excluded from all slaughter-houses or knackeries, and dog's meat ought always to be thoroughly boiled. (*b*) To destroy, as far as possible, the tape-worms generated in the dog, for which purpose it would be well that all dogs were periodically physicked, and their excreta buried in the ground or burnt."—W. H. G.

† In England the *strongylus gigas* is most rarely observed. No case has been recorded for some years, and only one specimen exists in the Royal College of Surgeons.—W. H. G.

Parasitic hæmatochyluria is rather an affection of the urinary passages than of the kidney, for it is in these organs that the *Filaria sanguinis* penetrates, causing perforation of the chyliferous vessels.

TUBERCULOSIS OF THE KIDNEY.

Renal Phthisis, Caseous Nephritis.

Etiology.—Renal tuberculosis is met with at all periods of life, from infancy to old age. Middle-aged men are most frequently affected.

The frequency of the disease in connection with general tuberculosis is exceedingly variable; *Engel* gives for Prague a proportion of 1 per cent.; *King* and *Chambers* give 18 per cent. for England. In the wards of the Friedrichshain Hospital we have not on an average reached 1 per cent. We naturally exclude from this figure disseminated renal tuberculosis, which appears as a local manifestation of acute miliary tuberculosis, a condition usually observed in children, and which is not of great clinical interest. In the majority of cases it is a symptom of a more or less generalized tuberculosis, and belongs to the series of localizations found in the genito-urinary apparatus.

The disease frequently appears *without* pulmonary phthisis or intestinal tuberculosis, as a sequel to tuberculous, scrofulous and simple suppurative lesions of the genito-urinary tract, of the spine, etc. *Simmonds* observed the disease nine times in thirty-five necropsies on men who had suffered from tuberculosis of the genital organs (fourteen times vesical tuberculosis); he believes, as we do in principle, in the "ascending" theory of development of uro-genital tuberculosis. Nevertheless, sudden descending propagation is not rare.

Von Krzywicki, from his observations, insists on the penetration of the bacilli from the surface of the mucous membrane into the depth of the tissues; he is of opinion that the lesion never spares the prostate, which he calls the "central focus."

Steinthal is of the opinion that the prostate is only involved when renal tuberculosis extends to the genital apparatus. Others give precedence with regard to frequency to the vesiculæ seminalis and the epididymis. Primary tuberculosis of the kidney is exceptional, and its etiology is unknown.

Pathological Anatomy.—Tuberculosis more frequently attacks both kidneys, but with varying intensity. We agree with *Israël* when he disputes *Rosenstein's* assertion that unilateral renal tuberculosis is exceedingly rare.

In the kidney small gray or yellow nodules are formed which afterwards coalesce and become caseous; they occupy the

capsule of the kidney, its cortex and medullary substance, the pelvis and the ureter. Through the breaking down of these infiltrations ulcers of the mucous parts are formed, and abscess-like cavities in the parenchyma, with a tendency to open into the pelvis. The tissue, free from tubercles, often shows nephritic changes. Usually such kidneys are only moderately enlarged, and great enlargement is only to be found when complication with pyonephrosis exists, in consequence of obstruction of the urethra through thickening of its walls, or blocking with caseous masses; diminution in volume is rarely found (*Rayer*, *Rosenstein*); the surface is rough and mottled.

When destruction is very marked, caseous trabecula of connective tissue alone remain; in extreme cases the kidney is only a thick-walled cyst with a few calyces, and filled with a caseous or ichorous pulp, rightly compared by *Israël* to a segment of ulcerated large intestines.

In primary tuberculosis, *Beselin* has recently described certain processes in the region of the tuberculous inflammation of the mucous membranes of the pelvis as "cholesteatomiform desquamation." This process consists of epidermoid transformation and hyperplasia of the epithelium, of desquamation of débris of glassy-like mother-of-pearl, which together with cholesterin, pus and necrosed tissue are evacuated through the ureter, accompanied by renal colic.

Apart from the cases where tubercular affections of the lungs, the intestines and the lymphatic glands exist, there will be found in men at the same time as renal tuberculosis similar changes in the bladder, the prostate, the seminal vesicles, the testes and the epididymis. A question still unanswered is whether the process is an ascending or descending one. In women tuberculosis of the genital organs far less frequently accompanies renal tuberculosis.

The importance of *Koch's* discovery of the tubercle bacillus in renal tuberculosis was first brought into notice by *Leube*, *Lichtheim* and *Babès*.

Symptoms.—Renal tuberculosis is so frequently associated with pulmonary tuberculosis and with the corresponding disease of the urinary organs that a general characteristic symptomatology is impossible. A fair number of cases escape diagnosis because the disturbances are not only usually insignificant at the onset, but remain so during the whole course of the disease. The non-destructive forms do not exercise any particular influence on the excretion of urine, as the affected tubuli uriniferi take no part whatever in the work of excretion. When the affection is unilateral and accompanied by obstruction of the ureter, the patient may pass a perfectly normal urine, if, of course, the parts situated below the obstruction are healthy.

In other cases, and when renal phthisis is complicated with tubercular pyelitis, the urine may furnish valuable information.

In that case pus and blood, alternately or together, are found in the urine in the most varying proportions. The microscope at the same time usually reveals the presence of débris, often also of casts and of epithelial cells of the urinary passages.

We have, like *Braatz*, observed at different times intermittent albuminuria, or even periodical attacks of hæmaturia, with microscopic signs of slight diffused nephritis.

The presence of elastic fibres, and of remains of connective tissue, simply indicates the existence of a destructive process; but the appearance in the urinary sediment of *caseous débris*, sometimes containing elastic fibres, is much more important (*Ebstein, Vogel, Rosenstein*).

The inoculation of rabbits with the purulent sediment, as tried by *Ebstein* and *Damsch*, may furnish decisive proof. *Rosenstein* states, however, that this inoculation does not always offer positive results; but the indisputable proof of the tubercular nature of the disease is furnished by the presence of *Koch's* bacillus in the urinary deposit (*Rosenstein, Leube, Babès, Cornil, Smith, Guyon, Mendelsohn*, and others), a fact which, it is true, in no way helps to explain the origin of the disease. In all such cases the same principles must be followed as in the case of the examination of sputum for the bacillus. A positive result only is of diagnostic value; a negative one is not conclusive.

As well as cases where the discovery of the bacillus is extremely easy (*Krecke*), cases of undoubted renal tuberculosis exist where the most careful examination of dozens of preparations does not reveal the existence of micro-organisms. In order to distribute the bacilli more uniformly in the urinary deposit, *Kirstein* recommends microscopic examination of the urine after vigorous agitation and filtration of the sediment.

Lustgarten and *Mannaberg* discovered in the secretion of the normal urethra bacteria which resemble in morphology and staining reactions with aniline the tubercle and smegma bacilli. These authors advise that observations indicating the presence of tubercle bacilli, dating from periods before *Alvarez-Tavel's* smegma bacillus was known, should be received with caution (the latter bacillus is easily mistaken for *Lustgarten's* "syphilis bacillus"). Thus, there is doubt in the presence of positive proofs, and more infallible ones must be sought for. From our personal clinical observations, we are in a position to affirm that, when we have met with bacilli of the tubercular kind in the urine, these bacilli have always proceeded from tuberculous foci. The smegma bacilli have never yet deceived us, for the simple reason that, in the cases which were not tubercular, we have in the course of ordinary investigation never seen a trace of *Alvarez's* bacilli. It must be understood that we do not speak here of those subtle differences which are hardly of practical value, such as the slightest discolouring of the smegma bacilli through alcohol

and acids, and their disappearance when the urine has been standing long.

Braatz, who found tubercle bacilli in ammoniacal fermenting urine ten days old, rightly draws attention to a fact which seems to clinch the matter; *i.e.*, the appearance *in groups* of tubercle bacilli in the urine. We have sometimes observed these groups by *Kirstein's* method. *Lustgarten's* and *Mannaberg's* caution may be theoretically correct, but is of no practical value. Finally, confusion is not possible if the above-mentioned flocculi and débris are found in the urine, and utilized for microscopical examination, these elements containing the greatest number of tubercle bacilli.

Pains in the lumbar regions are paroxysmal, and are either spontaneous or produced by pressure, and their intensity is of the most varying character. In cases where the ureter is obstructed, they resemble renal colic. The frequency of micturition depends, according to *Rosenstein*, on the point as to whether the bladder is affected or not. There is not one among his patients, he remarks, whose attention has not been solely drawn to the affection by the incessant straining and the pain at the end of micturition. Our experience does not accord with this view, and we maintain, in spite of *Rosenstein's* numerous observations, that in a large number of cases dysuria never occurred for months, sometimes not until death.

Recently *Harrison* points out that renal tuberculosis in infants often causes symptoms of gall-stone, as a result of the difficult passage of viscous secretion through the ureter and the urethra. *Leyden* observed death from uræmia in a case where the lungs were quite healthy.

Fever is seldom absent, even in cases where the renal affection is primary and solitary. We have observed almost all forms and varieties of temperature in our cases; thus, we cannot point to a characteristic curve. Advanced cases, especially those complicated with pulmonary phthisis, show a preference for the intermittent type (*Rosenstein*). We will not dwell upon what has been already said regarding the diagnosis of renal tumour, the consequences of pyonephrosis, and subsequent rupture.

Besides the fully developed cases, where all the signs and symptoms of phthisis are met with (pulmonary symptoms, fever, nocturnal sweating, dyspepsia, cachexia, etc.), there are others where the disease is insidious, and only reveals itself by intermittent symptoms, such as a slight pain in the lumbar region, the presence of a little pus or coagulated blood in the urine. In one of our cases painless hæmaturia persisted to the end, and the urinary deposit did not offer anything in the least suspicious. According to *König's* observations, renal tuberculosis is frequently complicated with multiple tubercular inflammation of the joints of various kinds.

Rosenstein records two remarkable cases where the pulmonary affection *followed* the renal one; in one of these it assumed the acute form, and proved fatal. That author rightly indicates that tuberculosis, localized to the kidney, does not necessarily assume the hectic type, and that, on the contrary, the general health may remain good for a considerable length of time.

DIAGNOSIS.—It is evident that the diagnosis of renal tuberculosis is very difficult, even in cases where numerous bacilli are found in the urine, especially when renal tuberculosis may be differentiated from tuberculosis of the other urinary organs. Regarding the latter, it is important to know that the kidney is more often attacked than the bladder. Thus, in the presence of chronic tubercular inflammation of the urinary passages, shown by the presence of bacilli in the urine, renal tuberculosis must be first taken into consideration, even without local renal lesions being discovered at the time. It is obvious that endoscopic examination is of great value in excluding tuberculosis of the bladder (*Küster*).

Nevertheless, the general diagnosis of uro-genital tuberculosis is by no means easy, if bacillus cannot be found. In order to avoid the diagnosis "chronic catarrh of the bladder"—unfortunately so much in vogue with many practitioners—great attention must be paid to hereditary predispositions, indications of scrofula, pulmonary phthisis, chronic epididymitis, affections of the prostate, fever, when the lungs are sound, and to persistent acid reactions of purulent urine (*Rosenstein*).

It often happens that renal tuberculosis is mistaken for cystolithiasis. In infants the co-existence of these affections is often seen.

PROGNOSIS.—The disease may last for months or years; the termination is always fatal. In exceptional cases it may even last over ten years. We have frequently observed remissions of long duration, and even intermissions of several months (apparent cures). In *Braatz's* case the recovery was so complete that the parents would not believe in the tubercular nature of the apparently "cured" renal affection.

As long as the lungs are fairly healthy, the greatest prudence must be exercised in appreciating the course of the affection. *Rosenstein* wisely recommends that the patient should be kept as long as possible in ignorance of the seriousness of his condition. For details on the influence exercised on the prognosis by surgical treatment, see the following section.

TREATMENT.—Although there are a certain number of cases in which nephrectomy was followed by good results, this operative proceeding is of too recent a date to permit of a definite appreciation of its value in a disease the course of which is generally very slow. Above all, it is important not to conclude by the disappearance of the bacilli after the operation that the other

kidney is normal, because primary renal tuberculosis is very seldom unilateral and absolutely localized. *Guyon*, with his great experience on this subject, has only seen one case of the kind. Nevertheless, it is our duty to hand over to the surgeon carefully diagnosed cases of unilateral renal tuberculosis when combined with pyonephrosis, and after the uselessness of other methods has been recognised. *Brodeur's* unfavourable statistics, which date from 1886, and according to which fourteen cases out of twenty-four terminated fatally, must not deter us in this matter. *Guyon* has published a later set of figures, showing eleven successes out of twenty-nine; in nine necropsies, a sound kidney on the opposite side was only found three times. He recommends that great prudence should be exercised regarding operation. In cases of obstruction of the ureter, with secondary dilatation of the pelvis, *Harrison* recommends drainage of the latter. *Küster* and *Kümmell* have quite recently recorded two very favourable cases of excision. On the whole, treatment must be guided by general principles.

At the onset, change of climate* has had unexpected good results, and caused intermissions of long duration. We have not up to the present time used creosote. In most cases narcotics cannot be avoided.

Prophylactic treatment is of great importance in cases of chronic gonorrhœa when there is a predisposition to phthisis.

CANCER OF THE KIDNEY.

Carcinoma.

Etiology.—The causes of *primary* renal carcinoma are unknown. Clinical observations of secondary renal carcinoma, the result of infection from primary cancer elsewhere, or of general cancerous manifestations, are very rare, and we therefore merely allude to them. In a certain number of cases hereditary predisposition seems probable. Blows, injuries, and concretions are often referred to as etiological factors, but with what right remains to be proved. Calculus must certainly be considered as an incidental cause (*Eichhorst*, *Israël*).

According to statistics of different authors (among others *Marc d'Espine*, *Virchow*, *Steiner*, *Cattani*), renal cancer is a rare affection. Comparing it with cancer of other organs, the proportion is 1·7 per cent. in Berlin, 3·8 per cent. in Prague; the average of the primary form is 1 per cent. We have observed a dozen cases of primary cancer out of a total of about 16,000 hospital patients. These cases are chiefly met with in children under ten years, especially under five (*Roberts*, *Neumann*, *Rohrer*, *Lachmann*, and others); then, again, in middle and old age. In

* Cannes, Catania, Hyères, St. Jean de Luz.—W. H. G.

adults the disease is more frequent among men than women (*Rosenstein*). *Congenital* forms have also been observed (*Kühn, Weigert*).

PATHOLOGICAL ANATOMY.—Primary cancer is almost universally unilateral.* The organ attains in the majority of cases more than double its normal size, and becomes sometimes enormous, especially in children. *Spencer Wells* relates the case of a child of four years, in whom the tumour weighed 17 pounds; *Roberts* and *Van der Byl* have also seen a case where the tumour weighed nearly 34 pounds.†

The growth sometimes presents itself as a *tumour*, sometimes as *uniform, diffuse infiltration*. In the former case, one or more protuberant tumours of varying size develop from the cortex; in the latter case, the form of the kidney remains unchanged. On section, the surface offers a homogeneous aspect, yellowish-white or red; post-mortem such cases may offer microscopically great difficulty. In the former case, on the other hand, undoubted discrete nodules, separated from one another by inflammatory changes of renal parenchyma, may be seen. Owing to ruptured vessels and a process of softening, hæmorrhagic cavities, resembling abscesses, often occur. Waxy degeneration often complicates the neoplasm.

The cancer most frequently met with, especially in children, is the encephalo-medullary form, which, owing to its rich vascular supply, becomes transformed into "fungus hæmatodes." Nevertheless, cases of alveolar carcinoma, scirrhus, colloid and adenoid mixed cancerous growths, combinations with sarcoma, etc., are often seen. Histological examination, which is of the greatest importance for the history of the development, is of no clinical value, and we therefore refer for details on this subject to the manuals on pathological anatomy. Let it suffice to allude to the fact that primary renal carcinoma generally originates from the epithelium of the urinary passages (*Waldeyer, Klebs, von Pereweseff*), whence proliferation takes place, which in turn forms alveoli filled with coiled epithelial tubuli. The stroma is supplied by the tunica propria and by proliferation of the intertubular connective tissue.

* Some discussion has arisen as to the frequency with which the disease affects either the right or left kidney. Out of fifty-four cases *Ebstein* found the right one affected thirty-one and the left one twenty-three times. In sixty unilateral cases observed by *Roberts*, each kidney was affected nearly an equal number of times. *Klebs'* observations prove the left kidney to be the one most frequently affected, and out of twelve cases *Dickinson* found the left kidney eleven times, and the right one only once, attacked. *Ralfe* declares that he has always observed in all diseases of the kidney having a unilateral tendency the left kidney to be most frequently affected.—W. H. G.

† *Schnoppel* ("Diseases of Kidneys," "Ziemsen's Cyclopædia," Eng. trans., vol. xv.) describes a kidney weighing nearly 28 pounds, and showing partly the characteristics of an encephaloid in a state of fatty degeneration, and partly those of alveolar colloid carcinoma.

Zenker's and *Schröder's* paranephritic carcinoma, which, originating from the vascular endothelium, penetrates through the hilus or through the lymphatic glands of the latter into the renal capsule secondarily, and destroys the parenchyma of the organ, must not be confused with carcinoma in the strict sense of the term and with genuine epithelial cancer. *Grawitz's* "malignant renal struma" is discussed further on.

At an early stage the tumour usually forms adhesions to the neighbouring organs. If it continues to increase in size, these adhesions may pave the way for secondary conditions, such as gastrectomy from compression of the duodenum, ruptures into the small intestines, the pleuræ, and externally.

Cancerous degeneration frequently affects other organs, either by embolism of cancerous particles or by continuity of tissue. This latter mode of spread shows a preference for the retro-peritoneal lymphatic glands and those of the hilus, for the supra-renal capsules, the liver, the intestines (*Monti*), and especially for the renal pelvis and ureter; in the latter case it is accompanied by hydronephrosis.

A recent observation of *Hartmann's* shows that the pelvis may be equally affected, primarily by the neoplasm. In one case *Lépine* found dilated calyces, pelvis and ureter filled with a dry amber-coloured mass, which he regarded as the product of the solidification of albumin by a process analogous to the formation of hyaline casts. He attributes the production of albumin to an enormous thrombus of the inferior vena cava complicating the primary renal cancer.

Proliferations of the neoplasms in the renal veins, from thence into the vena through conveyance of cancerous particles, may determine the development of secondary carcinoma, especially in the lungs. Metastasis in the muscles and thyroid are very rare (*Gerstäcker, Ebstein*).

It is a remarkable fact that renal cancer is not infrequently associated with carcinoma of the testicle, while the lower urinary passages are nearly always spared. When renal carcinoma is observed together with carcinoma of the testes, of the stomach, of the liver, of the uterus, and of the mammary gland, the latter are invariably secondary. In two of our cases cancerous proliferation led to compression of the ureter and ovary, and thus to death from uræmia.

As a rule, cancer only affects one kidney, and in the same measure as its secretory parenchyma is destroyed, the healthy kidney becomes hypertrophied.

Symptoms.—At the onset, and sometimes even during the whole of the course of the disease, the symptoms remain uncertain and obscure. The cardinal symptoms are: *renal tumour, pain, hæmaturia, progressive cachexia.* The first and the last of these signs are the most constant; all four are seldom absent; either may

appear as first manifestation, and there is no rule as to the order of their appearance.

Out of 115 cases, *Rohrer* observed the presence of a tumour 47 times, and hæmaturia 37 times; 36 times the cancer was latent and had presented neither of these symptoms. *Leibert*, who saw 50 cases in infants, noted the presence of a tumour 36 times, as the first sign, and hæmaturia 19 times (a somewhat larger proportion than with adults). He lost one infant from hæmorrhage.

We ourselves—perhaps through chance—have only observed transitory hæmaturia once in four cases in children. On the other hand, in eight adults treated by us, hæmaturia was, so to speak, constant, and lasted for long periods. One of these patients had hæmaturia for one night only, six months before his death.

In infants the largest abdominal tumours are the result in the majority of cases of renal carcinoma, and it may occupy half and more of the swollen abdomen. The aspect of the little patients is very characteristic towards the end, and is not easily forgotten, an enormous abdomen, with small and emaciated thorax and withered, thin extremities, forming a strange contrast.

Displacements of the viscera are very variable; they are usually analogous to those described in the section on "Hydronephrosis." The tumour of the *right kidney* pushes the small intestines towards the left, while the ascending colon lies obliquely in front of the tumour; the liver is pushed over towards the left, and often assumes a vertical position. In larger cancerous tumours of the *left kidney*, the stomach is displaced towards the right, the spleen upwards, and the descending colon generally separates the tumour from the abdominal parietes.

When the tumour continues to develop, the lungs and heart participate in the displacement, and that in a more marked manner than generally stated in text-books. We have seen in a child of three an enormous cancerous tumour of the right kidney, with the heart beating under the left clavicle. In this case the tumour, still far from having attained its full size, moved up and down with respiration.

Israël was able to discover by palpation a tumour the size of a cherry-stone in the lower segment of a normal-sized kidney.

Sometimes the whole of the tumour is quite soft, elastic, hard, smooth or nodular, sometimes only uneven in one part; it sometimes gives rise to apparent fluctuation, or sometimes simulates scybala or masses of glands.

The second cardinal symptom, *pain*, is the most variable. It is sometimes bearable, sometimes violent, remittent, intermittent, and, again, radiating. The inexperienced and careless physician naturally takes it for "rheumatism" or "sciatica." The latter condition, however, may really be present in consequence of pressure on the sciatic nerve by a secondary, lymphatic glandular cancer. Various forms of neuralgia and paræsthesia, and even motor

disturbances (*Gerstäcker*) in the lower part of the body, are explained post-mortem by the discovery of unsuspected growths which pressed on various nerve trunks, or perhaps by their involvement of the spinal cord. In a case recently observed by us, an enormous carcinomatous tumour of the left kidney existed, and the diagnosis was confirmed at the necropsy. The principal symptom for months had been paresis and pain in the left leg, which led the first physician consulted to conclude that the lady was hysterical. These pains must be distinguished from genuine attacks of colic, which occur—according to our observations, fairly frequently—as a sequel to obstruction of the ureter by cancerous masses or coagulated blood.

Hæmorrhage may be insignificant or profuse, and may even endanger life; it occasionally determines an acute tumefaction of the affected organ, recognisable by palpation. Whatever the stage of the disease, hæmaturia may appear insidiously, or unexpectedly and quite suddenly.

The quantity of hæmorrhagic urine does not ordinarily offer characteristic modifications; it sometimes contains fairly large blood-clots, and even casts of the pelvis and ureter. These clots, after having traversed the ureter, with symptoms of colic, may in the bladder obstruct the opening into the urethra, and cause severe and painful anuria. We saw this recur several times in the course of many months in an aged patient. In that case it was never doubted for a moment that the hæmorrhage proceeded from the bladder, and it was only after the demonstration of a renal tumour, the size of a man's fist, that we had to give up the favourite diagnosis of "vesical hæmorrhoids."

The expulsion of elements partly discoloured, vermicular or tuft-like (fibrinous clot), a phenomenon observed by *Smith*, was evidently occasioned by previous hæmorrhage.

In a certain number of patients, especially in children, *cachexia* gives the clue to the nature of the disease. It is usually distinguished by insomnia, by frequent hæmorrhages and serious dyspeptic symptoms, accompanied by the most obstinate constipation. In a series of cases it only appears late, and sometimes only with the closing scene.

Amongst the other symptoms, the character of the urine must be specially referred to. When inflammatory lesions of the renal parenchyma exist, it presents a nephritic character; when the disease is complicated with nephrolithiasis, a pyelitic character. Pyuria, following pyelitis, or even cystitis determined by neoplasm, is also observed. Too much stress cannot be laid on mistaking clavate and caudate epithelial cells for cancer cells.

Desquamation of the mucous membrane of the pelvis and the bladder gives rise to the same strange forms as does new growth. Doubt is impossible when the urine contains particles which reveal the alveolar structure; unfortunately, this case is rare.

Rosenstein, like us, has not had an opportunity of making these observations personally, in spite of the most careful investigations. *Sticker's* case is the most convincing. It consists in the evacuation of large polymorphous cells, and of débris containing epithelial nests.

Dyspnœa, brought about by pressure on the lungs, œdema of the lower extremities in consequence of pressure on the large abdominal vessels, carcinomatous or simple thrombosis of the vena cava, of the cutaneous veins, of the abdomen, and even reversion of the blood-stream (*Lépine*), are met with fairly frequently, at least some little time before death. The latter is nearly always the result of exhaustion or uræmia (observed by us four times); less frequently it follows peritonitis, pleurisy, sepsis (caused by breaking down of the cancer).

In children the disease lasts for months, in adults for years; six months may be considered an average in the former, three years in the latter. *Dunlop* mentions three cases which lasted more than ten years.

Lépine observed a case of carcinoma of the right kidney, with considerable œdema of the lower extremities. The urine was quite free from albumin. Necropsy showed that the neoplasm extended over the right renal vein to the inferior vena cava, and to the left renal vein, and the obliteration had involved a venous collateral circulation. The normal condition of the urine was due to the fact that the affected kidney took no part in excretion of the urine.

Diagnosis.—At the onset of the disease, and even at a more advanced period, diagnosis is difficult, especially at the first examination. A large renal tumour in an infant is *à priori* in favour of cancer, as hydronephrosis and cysts are, in this case, of congenital origin.

The cardinal symptoms already mentioned, when met together, are almost proof positive; when met singly, great caution is required before attributing any diagnostic value to any of them.

On the strength of renal pains, hæmaturia and cachexia, *Davy* removed a kidney, but found it quite free from cancer; the post-mortem disclosed a cancer of the rectum and bladder.

Careful observance of what has already been said in the section on "Hydronephrosis" gives us the rules on which differential diagnosis between renal tumour and *tumour of the liver or spleen* must be based. *Rosenstein* saw a case of cancer of the left kidney, in which the descending colon was found *behind* the tumours, and the splenic dulness was continuous with that over the tumour. We observed nearly the same state of things, except that during life the spleen, which was lodged forward, could be made out by palpation to be separate from the renal tumour.

Small renal cancers are not accessible to palpation. The

diagnosis made by *Israël* in the case which we have related above is, as any experienced person must admit, exceptional, even in such skilled hands as his. It must not be forgotten that floating kidney not unfrequently becomes the seat of cancer.

For the differential diagnosis between *ovarian tumours* see section on "Hydronephrosis."

It is often a matter of extreme difficulty to distinguish renal neoplasm from large masses of *caseous glands* situated in the hypochondrium, and from tumours involving the retroperitoneal glands, because in those cases the same relations with the other organs, especially with the colon, exist (*Ebstein, A. Weber*).

Renal cancer of moderate size is often mistaken for *coprostasis*, especially when in the region of the cœcum, and of the ascending colon. In our first case of cancer of the right kidney in an infant, we confidently administered all kinds of purgatives. As a means of diagnosis, this course cannot frequently be followed; the history, the clay-like consistence of the fæcal masses, the facility of kneading against the abdominal walls, usually prevent error.

Psoas abscesses never reach as high as renal tumours; they are accompanied by fever, which one does not find in the case of uncomplicated renal cancer.

No hesitation in distinguishing ascites from a tumour ought nowadays to exist.

In order to distinguish renal hæmaturia from vesical hæmaturia, one must depend on the signs already referred to. In certain cases, whatever is done leads to no result—not even endoscopic examination.

With regard to the histological and clinical classification of the nature of the tumour, the character of the surface, especially the presence of rough protuberances and varying consistence of the different parts, ought to be sufficient indication to prevent mistaking cancer of the kidney for hydro- and pyo-nephrosis.

Exploratory aspiration supplies very valuable information, bringing to light particles of obviously cancerous structure (*Kussmaul, Doederlein, Schüppel, Ebstein*). Aspiration is usually considered dangerous; we are, like *Ebstein*, not of this opinion, if all necessary precautions are taken. In the case of a little boy, three years of age, who had an enormous abdominal tumour, which we had watched for some time, aspiration repeated several times, as well as the removal of portions of the tumour, did not produce the slightest reaction. Aspiration supplied us with a tolerable quantity of a muddy, sticky liquid, containing medullary masses emerging through the trocar in long vermiform threads. The microscope revealed the structure of medullary cancer; the necropsy confirmed the diagnosis as to the nature of the disease, but showed that the origin of the condition was not in the kidney, but in the small omentum.

We have already discussed the value of polymorphous epithelium in urinary deposit.

Thiriar attaches great diagnostic importance to the determination of the urea, inasmuch as an average daily excretion of less than 12 grammes of urea proves, according to him, the existence of a malignant tumour. It seems to us impossible to base a diagnosis on such modification of the metabolism of the body.

When all the symptoms just discussed are insufficient to establish a positive diagnosis, and when the progress of the malady demands a prompt decision, laparotomy or exploratory lumbar incision is indicated. In desperate cases it is our custom to recommend surgical interference.

PROGNOSIS AND TREATMENT.—We will discuss the prognosis and treatment of primary renal cancer, together with that of sarcoma of the kidney.

SARCOMA OF THE KIDNEY.

Primary sarcoma of the kidney, as well as secondary sarcoma (which we will not discuss here), is very rare. *Rosenstein* has been able to collect thirty cases. It seems more frequent in infancy and among women (*Rosenstein, Lauer, Haug, Taylor* and others).

Varieties of spindle or fusiform cells dominate. Amongst the different varieties of sarcoma, one must note myxosarcoma, adenosarcoma, angiosarcoma, fibrosarcoma, and especially one form, very interesting from the histological point of view, the striocellular myosarcoma (*Eberth, Cohnheim, Landsberger, Marchand, Huber, Boström, Brosin*), the structure of which seems to point to a *congenital* origin, as being a relic of aberrant embryonic tissue. Combinations of sarcoma with carcinoma are often found.*

The histological characteristics of all these varieties are to be found in works on pathological anatomy and histology. Renal sarcoma has a peculiar tendency to fatty, caseous, and cystic degeneration.

The symptoms—at least, for the myeloid forms, which grow rapidly—are the same in all essential points as those of renal cancer. Hæmaturia seems to be equally frequent. *Neumann* observed it five times in fourteen cases. Its differentiation from carcinoma, which is also of prognostic value, seems usually to be

* According to *Guillet*, the striated sarcoma is nearly always found in infants varying from seven months to three years. He has very often found them bilateral—four times out of eleven cases.

Paul, in the "Liverpool Report of New Growths of the Urinary Organs" (*British Medical Journal*, January, 1884), describes two sarcomatous kidneys, weighing 12 ounces, from a seven-months fœtus; and *Osler*, of Montreal, in the same report, gives us an account of two kidneys likewise affected taken from an eight-months fœtus, and both equally enlarged.—W. H. G.

exceedingly difficult; in fact, its possibility has rightly been denied, unless the urine or the exploratory trocar do not contain some particle of the tumour; sometimes even diagnosis may be doubtful, in spite of microscopic examination (*Monti*). When the general condition of the patient is only slightly affected, the presumption is in favour of sarcoma. Combinations of sarcoma with carcinoma are outside the sphere of clinical diagnosis.

PROGNOSIS AND TREATMENT OF PRIMARY RENAL CARCINOMA AND SARCOMA.—The prognosis must not be considered as absolutely unfavourable in the face of a series of successful operations practised on renal tumours, even under most difficult circumstances (*Thornton, Czerny, Martin, Langenbach, Barker, Jessop, König, Schönborn, Kümmell, Frisch*—the latter removed a renal sarcoma of about 7 pounds in weight—*Orlowsky, Krönlein, I. Israël, Albert* and others). *Lossen* even successfully excised a very large renal angiosarcoma during pregnancy.

According to *Braun*, one may hope that in cases of malignant renal tumour nephrectomy will give lasting results if the diagnosis has been made at a time when the tumour is still of moderate dimensions, is completely encapsuled, and has not given rise to metastatic conditions or formed adhesions with the neighbouring organs (aorta, vena cava, colon). *Bergmann* and *Le Dentu* express a similar opinion. Be this as it may, the results up to the present have not been very encouraging. According to the statistics of *Homans, Gross* and *Péan* (1885), out of totals of 26, 49 and 21 nephrectomies for malignant tumours, 17, 30 and 11 respectively proved fatal. The larger proportion of children attacked by renal sarcoma die from the operation or from recurrence. For this reason *Le Dentu* considers these cases as contra-indicated.

The most recent statistics of *Brodeur* only show 6 successes out of 17 nephrectomies for renal carcinoma, and 14 out of 29 excisions for sarcoma. Naturally, the number of unpublished unsuccessful operations cannot be estimated. Nevertheless, in the presence of the necessarily fatal issue of the disease, one must not hesitate to interfere surgically.

Provided the general health be good, the sarcomatous floating kidney offers the best chance of success being achieved, on account of the considerable length of the pedicle (*Neumann*). But in this case also the operation becomes entirely useless when the disease has involved the other kidney; thus, in the first stage of life, when congenital tumours of both kidneys generally exist, the operations should not be performed (*Neumann*).

In cases where surgical interference is contra-indicated, the prognosis for both carcinoma and sarcoma of the kidney is equally bad. The treatment can then only be symptomatic, *i.e.*, poultices, warm baths, and, above all, narcotics, the good effects of which cannot be denied. The patient ought not to be tormented with painful contra-irritation.

Styptics and ergotin are not especially efficacious against profuse hæmorrhages. *Fenwick* ventured recently on bold manipulation. This manipulation, called "clottage," consists in obstructing the ureter by means of the blood-clot enclosed in the renal pelvis. This method is executed by aspiration through a catheter.

If clots of coagula formed by the hæmorrhage are retained in the bladder and cause painful anuria, one must use the catheter and gently wash out the bladder. Cachexia should be treated on general principles. Psychical treatment destined to cheer the patient is, as *Rosenstein* specially emphasizes, of the greatest importance in such a sad and long disease.*

* *William Anderson*, "A Case of Carcinoma of the Left Kidney of Unusual Duration; Nephrectomy—Recovery": *Lancet*, vol. i., 1895.—"The history of an enlargement noticed for six years in the region of a kidney which proved to be the seat of a carcinomatous growth is unusual, more especially as hæmaturia, one of the most characteristic symptoms of such a disease, was absent throughout. As regards removal of such growths of the kidney, *Mr. Greig Smith* writes: 'In all cases where the disease has been known to exist for some months, where the growth is large, and more particularly if it is firmly adherent in the loin, no operation is advisable. . . . In a word, for malignant disease nephrectomy is a justifiable procedure only in a few specially selected cases.' In this patient there appeared to be no evidence of secondary growth, and the result of the operation fully justified the removal of the kidney. We are of opinion that statistics of the operation of nephrectomy for malignant disease would show a greatly diminished primary mortality at the present time. The case to which *Mr. Anderson* draws attention in his remarks is one which shows the close resemblance between a malignant growth of the large bowel in front of the kidney and a tumour of the kidney itself. The difficulty thus caused in coming to a correct diagnosis does not often present itself in actual practice, but should be borne in mind. It would be very much increased if a renal growth had extended into the overlying bowel and produced destruction of its wall. Such a case has been recorded by *Dr. Pescher*; there was extensive adhesion between the tumour (a primary hard carcinoma) and the colon, with numerous perforations of the latter, allowing of the escape of fæcal matter into the peritoneum. For the notes of this case we are indebted to Mr. *Finch White*.

"The patient, a woman aged fifty-one years, was admitted into St. Thomas's Hospital on January 3 last, with a tumour on the left side of the abdomen. The growth was first noticed six years ago (nine months after the birth of her last child) as a painless prominence of the size of a fowl's egg, situate near the level of the umbilicus. She had lost flesh during the few previous months, but remained fairly strong, and had suffered from no functional disturbance, except a slight cough with occasional expectoration of a little blood-stained mucus. There was a family history of strong tuberculous predisposition, but none of malignant growth. On admission she was a tall, thin woman, somewhat emaciated, but showing no sign of prostration. Local examination demonstrated a tumour of irregularly rounded outline, and about the size of an ostrich egg, projecting below the costal border on the left side; it could be traced backwards into the loin, downwards as far as the iliac crest, inwards to the median line, and above as far as the line of gastric resonance. It was dull on percussion, insensitive to pressure, and was freely movable within certain limits, but appeared to have connections at the back of the abdominal cavity. The descending colon ran down on the outer side of the mass. The urine contained a trace of albumin, but no other evidence of visceral disease was ascertainable. It was considered that the growth was most probably renal or omental in origin, but in any case an operation was desirable. On February 4 *Mr. Anderson* opened the abdomen through the left linea semilunaris. The great omentum was exposed, and on drawing this up the

In connection with renal sarcoma we will mention myxoma, angioma, fibroma. (*Bruntzel* successfully removed one weighing more than 42 pounds.) *Brodeur* succeeded in 1866 in obtaining eight successes in ten cases of excision of fibroma and fibro-adenoma, adenoma, lipoma, enchondroma, and renal osteoma. All these tumours are only of subordinate clinical interest.

Gummata of the kidney are seldom met with. The albuminuria which they give rise to may be successfully treated by the usual specifics (*Seiler* and *Andronico*).

We must not omit to speak here of *Grawitz's* recent discovery. According to his experience, the majority of renal tumours, small or large, described under the name of adenoma and adeno-sarcoma, do not originate from the tubuli uriniferi, but from isolated tissue which must be considered as disseminated particles of a substance analogous to the suprarenal capsules. As *Strübing* recently proved, this suprarenal or heterologous renal struma leads, like cancer, to a very variable combination of clinical symptoms. It forms large cysts, with peculiar hæmorrhagic or fatty contents which may be got rid of in the urine, usually normal. It leads to metastasis. Aspiration is only permissible for diagnostic purposes. Nephrectomy should be done as soon as possible, but, naturally, only when the other kidney is presumed to be sound, or at least sufficiently able to perform its functions.

RENAL CYSTS.

Renal cysts are usually only discovered post-mortem. They are nevertheless forms for which *Stiller*, in order to distinguish them from hydronephrosis and hydatids, has recently suggested the term *polycystic degeneration*, which has a certain clinical interest.

We have already indicated the correlations between the development of cysts in the kidney and diffused chronic nephritis, and especially of *renal atrophy*. Apart from this relationship, as

posterior parietal peritoneum and the left colic vessels were found to be tightly stretched over the tumour, while the descending colon was pushed over to the left. The colic vessels were ligatured, and the peritoneum was divided, exposing a smooth, rounded, slightly lobulated growth, which could be traced backwards to its origin from the upper end of the left kidney. It was carefully isolated, the pedicle of the kidney was exposed, and the renal vessels, with the ureter, were divided into three segments, which were ligatured separately. The whole mass was then detached and the abdominal wound closed. The suprarenal capsule was not seen during the operation, and no enlarged glands could be felt. Little blood was lost, but an enormous number of ligatures were required. The shock of the operation was rather severe, but not grave, and the patient was in good condition on the following morning. The temperature remained normal, in spite of an attack of bronchial catarrh, until the end of the week, when a slight rise occurred. On removing the dressings, a quantity of inodorous pus escaped from the lower angle of the wound. The discharge gradually ceased, and the patient left the hospital on March 24. The tumour was pronounced by *Mr. Shattock* to be a carcinoma involving the upper third of the kidney."—W. H. G.

well as from the congenital and cystic degeneration (see below), renal cysts are usually met with in middle-aged persons, and they often coincide with analogous formations in the liver. They result from obstruction of some of *Bowmann's* capsules (*Rokitansky, Beckmann*), and are consecutive to glomerular hæmorrhages (*Rosenstein*). As *Virchow* and *Klein* have described, the cystic cavities may also gradually develop from the Malpighian corpuscles. The cysts may also proceed from the dilated tubuli uriniferi, the exact pathogenesis of which is shown in the congenital varieties, which we shall study later on, and which, from a practical point of view, are of the greatest importance. These dilatations are produced as a sequel to constriction (*Beckmann*), obstruction by plugs of proliferated epithelium (*Brigidi* and *Severi*), calcium infarctus (*Virchow*), spreading of pyelitis over the stroma of the medullary cone (*Thorn*); finally, by "nephropapillitis fibrosa obliterans" (*Leichtenstern*), due to the morbid alteration of the arteriolæ rectæ veræ.

In a certain number of cases of cystic degenerations in adults, the first development may date back to earliest infancy.

Degeneration affects one or both kidneys. The cysts may be either single or multiple; they are usually not larger than a cherry; they are seldom as large as a fist, but exceptionally they may attain to a very large size and occupy a considerable part of the abdominal cavity.

The development of the cyst, which is often multilocular or provided with rudimentary septa, takes place at the expense of the renal parenchyma, of which only small portions remain behind, and which is often found in a state of chronic inflammation with compensatory hypertrophy of the glomeruli and tubuli uriniferi (*Philippson*).

In consequence of the proliferation of subcapsular cysts through the layers of the capsule, large mantle cysts may originate which enclose the cystic degenerated kidney (*Prudden*). The cysts are lined with flat polygonal epithelial cells.

Its contents are either clear, serous, pale yellow or gelatinous, hæmorrhagic or colloid; it contains occasionally albumin in large quantities, fat, cholesterine, epithelial cells (even the ciliated kind), blood constituents, corpora amylacea, pigment, much débris; finally, sometimes—as characteristic elements—urea, and even uric acid crystals.

Cysts only produce marked *symptoms* when they are of considerable size. Examination then shows the existence of a renal tumour, with displacement of the adjacent organs and the corresponding disturbance of function (see "Hydronephrosis"). Among other symptoms, albuminuria, resulting from accompanying nephritis and periodical hæmaturia, are the most constant. Like hydronephrosis, cystic degeneration of the kidney is complicated with hypertrophy of the left ventricle, due to atrophy of

the renal parenchyma (*Bamberger, Ebstein, Strübing*). Under these circumstances it is evident that the urine is analogous to that in renal atrophy.

The *course* may be insidious, and death may occur in consequence of unexpected uræmia. There are cases in which atrophy of the renal parenchyma is shown to exist many years before, in consequence of œdema coinciding with periods of weakness of the hypertrophied heart. Suppuration of the cysts, rupture, and perforation into the adjacent organs are not unfrequent occurrences.

Diagnosis is difficult. It is often impossible to differentiate cysts from hydronephrosis and hydatids. The absence of fluctuation is, according to *Stiller*, an important, even pathognomonic, sign, characteristic of polycystic degeneration.

TREATMENT.—Regarding treatment, the same principles hold good as in the case of hydronephrosis and hydatids. By excision of the whole kidney *Leopold* successfully removed a hæmorrhagic renal cyst as large as a man's head, which resembled an ovarian tumour.

Klaus also observed the same favourable result after excision of a renal cyst. *Riegner* removed a movable cystic kidney with good results. *Brodeur's* statistics of twelve operations show five successes (eleven excisions, one nephrectomy). In the case of congenital and acquired renal cysts, *De Jong* obtained eight successes in the same number of nephrectomies. The operation is therefore eminently satisfactory in its results.

Congenital cystic degeneration (*Virchow's* "hydrops renum cysticus congenitus") is usually bilateral. According to *Virchow's* and *Foerster's* researches, its origin is generally to be found in the coalescence of the tubuli uriniferi, in obliteration of the papillæ by embryonic nephritis, in the production of uric acid infarcts.

The obstruction may also be found in the urinary tract, or the condition may result from atresia of the pelvis, and even in congenital phimosis (*Aran*). It is evident in such cases that distinct similarity exists with what has been said of the genesis of hydronephrosis. *Klebs* accuses external mechanical disturbances, and *Nieberding* attributes it to engorgement in the kidney, produced by the absence of the ductus Bottali.

The subjects of congenital cystic disease have generally some other congenital defect—atresia of the ureter, vesical malformations, uterus bipartitus, various malformations of other organs, such as cleft palate, hydrocephalus, transposition of viscera, imperforate anus, club-foot, etc. In a certain number of cases family predisposition is indisputable.*

The congenital cystic kidney presents itself under the aspect of

* *Ebstein* describes a case with cystic kidney on the right side, in whicl. the right lower extremity and half of the female genitals were missing, and the left side of the body was normal.—W. H. G.

a congery of cysts of divers sizes, varying in colour from gray to grayish-red, divided by septa of connective tissue and remains of parenchyma, vesicles which *Nieberding* rightly compares to grains of boiled sago. The aqueous contents of the younger specimens betray their retentive character through urinary constituents, such as urea and uric acid, as well as albumin.

In some cases the great size of the tumour (size of a child's head) becomes a cause of dystocia, and necessitates embryotomy. Generally pregnancy is interrupted, and the fœtus often succumbs during or after parturition from asphyxia, due to compression. If children are born alive, they frequently die shortly afterwards from anuria, with symptoms of anasarca, coma, convulsions, tetanus, trismus and other uræmic symptoms, as in the cases of *Aran* (death nine days after birth), and of *Böckmann* (death the nineteenth day after birth), etc.

Life is only possible in those cases in which the parenchyma is more or less able to perform its secretory functions, and in which only slight cystic degeneration exists. In a case of this kind we saw a healthy child die suddenly at the end of the first year.

We have already spoken of cystic degeneration of the *ureters.*

ABNORMALITIES OF THE KIDNEYS.

Floating Kidney.

Ren Mobilis, Ren Migrans, Renal Ectopia, Rein Flottant.

The term "floating kidney" is applied to a kidney which is spontaneously displaced, drawing with it its peritoneal covering. Thus defined, it must not be confounded with simple displaced kidney (abnormally fixed) and the extraperitoneal floating kidney, for which *Litten* has essentially reserved the designation "movable kidney."

Etiology and Pathogenesis.—Renal ectopia, the clinical history of which is due to *Rayer*, is much more frequent than was formerly supposed. *Landau* alone observed more than 300 cases. Many an obscure abdominal affection is the non-recognised manifestation of floating kidney. On the other hand, the diagnosis is often made during life (*Walther*). In 90 per cent. of all cases the *right* kidney is movable, in the remaining 10 per cent. the left and both kidneys. The predominance attributed by *Hennig* to the left kidney is explained by the small number of cases on which he bases his assertion. Our personal observation confirms *Landau's* statistics.

Women over thirty (*Rayer*) are most frequently affected (*Ebstein, Landau*); under this age the disease is rare. The affection is six to eight times less frequent in men (*Rollet, Schütze*). It has been stated that the great majority of women suffering

from floating kidney have been pregnant and belong to the working classes (*Löhlein*). *Senator* is not of this opinion, and we must own to agreeing in the main with him.

Everything which leads to relaxation of the attachments of the kidney plays a part in the etiology of this disease. From what has been said, it follows that the floating kidney is not only surrounded *on all sides* by the peritoneum, but that it has formed its own "meso-nephron." Thus, the first condition for its origin is an abnormality—nearly invariably congenital—of the peritoneum. *Dunin* has recently again laid particular stress on this point.

Besides the extension of this natural attachment, the intra-abdominal pressure and the fatty capsule of the kidney have to be considered. It is evident that the relaxation of the abdominal walls, through which the intestines also lose their support, may become an important etiological factor of renal displacement. It is generally met with as a sequel to repeated pregnancies—at least, in those patients in whom the *abdomen* becomes *pendulous*, which is the case, according to *Landau*, in 95 per cent. of the cases; it also occurs in cases of large abdominal tumours, ascites, etc., as well as in emaciated individuals. Perhaps in the latter its occurrence is only apparently frequent, inasmuch as the absence of fat favours the discovery. Nor must it be forgotten that even rapid emaciation following other diseases is only a subordinate factor in the genesis of floating kidney (*Senator*). Nevertheless, *Rosenstein* and *Braun* remark that atrophy of the fatty capsules of the kidney, or atrophy accompanied by relaxation and loosening of the peritoneum, by no means necessarily corresponds with general loss of fat in the body. *Landau* (oral communication) was much struck by the association of the floating kidney with tabes and heart affections.

Since this author has drawn attention to the frequent association of renal ectopia with various other conditions, especially with prolapsus of the female genital organs, *Glénard* has started a curious theory from a more general point of view. According to him, the floating kidney is only one among other symptoms of a general "enteroptosis," *i.e.*, of a descent of the entire intestines in consequence of an atelectasis or diffuse stenosis of the intestinal tube, atelectasis accompanied by a decrease of the intra-abdominal pressure, and which in its turn leads to tension on its attachments. This enteroptosis forms the basis of the most various affections, especially nervous ones, which are unjustly alone attributed to floating kidney. Although we cannot entirely accept this ingenious theory, we must confess that it applies to certain cases.

Displacement of the kidney may also be produced by neighbouring tumours, especially by those situated between the kidney and liver (*König*). As to tight-lacing, considered as an etiological factor, some authorities attribute a certain importance to it

(*Cruveilhier, Senator, Quincke, Fischer-Benzon, Leube*); others consider it as doubtful (*Rosenstein*). *Bartels* declares that the pressure exercised by tightly-laced corsets, tight petticoats, and tight belts affects the kidney constriction of the lower thoracic segment, and, by compressing the duodenum between the kidney and the liver, becomes also a cause of gastric dilatation. On the contrary, *Litten* has recently attributed a primary *rôle* to the latter, and declares that it forces the liver and kidney *upwards*. It is probable that both effects act alternately (*Nothnagel*).*

We mention *Martel's* opinion solely as a matter of curiosity. According to him, it is the movements of the lower extremities of the fœtus which force the kidneys gradually away—the right one more often than the left, as the first cranial position is the most frequent.

In a third class of cases, the influence of any condition which increases the weight of the kidney is undoubted; floating kidney is not unfrequently complicated with lithiasis, cancer, and hydronephrosis (which, however, may, as we have remarked before, occur as a sequel). In the majority of cases, displacement is prevented by perinephritic adhesions. Traction on the ureter, in consequence of dislocation of the pelvic viscera, especially of the uterus (*Landau*), is also a favouring etiological factor. By merely pointing to engorged kidney and nephritis, we may dismiss *Becquet's* and *Lancereaux's* theories that even catamenial congestions of the organ may be of etiological importance.

On the other hand, the influence of traumatic displacement of the kidney is undoubted; blows, falls, carrying heavy weights, violent pressure and straining, whooping-cough, hay-fever (*Landau*), vomiting, constitute the most frequent causes of floating kidney, always presuming the existence of the predisposing factors above-mentioned. Hence its frequency in the working classes. In a certain number of cases, discomfort immediately follows the injury (*Frerichs, Dusch, Henoch, Nagy*).

Lindner, from his personal observations, is of opinion that there is a predisposition—*i.e.*, congenital anomaly—in the majority of

* *Ralfe*, in "Diseases of the Kidney," observes: "Notwithstanding the arguments of *Landau*, and, more recently, of *Newman*, there can be little doubt that there is truth in the opinion expressed by *Cruveilhier*, and supported by *Dr. William Roberts*, that tight-lacing is competent to produce downward displacement of the kidney, as it is competent to produce vertical elongation of the liver and downward displacement of the pylorus. But acquired downward displacement of the kidney practically means a movable kidney; for once displaced from its nest, the kidney goes adrift. In connection with the greater frequency of movable kidney in women, *Becquet* has put forward a theory. He states that at each menstruation there is a marked increase in the size and vascularity of the kidneys, due probably to the close association of the renal and ovarian nerve plexuses. This periodic enlargement he believes to be a cause of movable kidney, as well as of the lumbar aching so frequently complained of during menstruation."—W. H. G.

cases of floating kidney. *Schütze* has remarked no less than eight cases in children of a probably congenital character.

Greater frequency of the displacement of the *right* kidney is evidently due to some anatomical condition (*Landau*). The descending meso-colon is shorter and firmer than the ascending one; the left renal artery lies close to the pancreas; the fixation of the left renal vein is firmer, on account of its inosculation with the suprarenal veins; the left renal artery is shorter than the right. Finally, the left kidney is kept firmly in place by *Zuckerkandl's* recto-renalis fascia.

The degree of mobility of the floating kidney depends on the length of its meso-nephron and of its artery, the length of which forms the radius; as *Dunin* has shown, it may be increased to twice its length through the weight of the kidney (from 7 to 10 cm.).

Pathological Anatomy.—The capsule in which the floating kidney is lodged is usually poor in adipose elements, even when nutrition is satisfactory. The displacement is *downwards*, sometimes even extending as far as the iliac fossa, *forwards* or towards the *median* line or towards the spine; the pedicle is usually twisted, and almost always covered by the intestines. It is rarely in its normal position. Its dimensions are regulated, as we have observed, by the length of the meso-nephron and the renal vessels, especially of the renal artery, which is most frequently enlarged. Various portions of the colon and of its meso-colon are displaced, according to the degree in which the kidney has penetrated into them; sometimes the whole of the intestines descend (*Glénard's* "enteroptosis").

A sound floating kidney is much more often found than a diseased one, viz., than a hydronephrotic, cancerous, or cystic floating kidney.

Symptoms.—Subjective symptoms may, according to *Landau*, be absent in a great number of cases; they may be either slight or severe, and in the latter case make the life of the patient intolerable. Their multiplicity is great. We have met with the most varied combinations and mixed forms of hysteria and neurasthenia. The most usual symptoms are: peculiar sensations in the abdomen, a feeling of something loose, a sense of pressure, of weight, of painful dragging, especially when the body is in any way moved or shaken (as in riding, dancing); we have also observed spinal irritation. As soon as the patients are aware of the malady, they become hypochondriacal, uneasy, and irritable. Increase of discomfort during menstruation, entire cessation of pain in the intermediate periods, distinct pains in the renal region, which *Lancereaux* attributes to the dragging on the renal plexus of nerves and its connection with various radiating pains in the shape of intercostal, lumbo-abdominal, crural, and intestinal neuralgia—even on the opposite side

(*Landau, Géneau de Mussy*)—finally, dyspepsia in its most varied aspects, keep the patient almost entirely in the physician's consulting-room, and the latter is apt to look upon them as hysterical, rheumatic, gastric patients, or he considers them as cases of hepatic lithiasis, if icterus be present, or of renal lithiasis.

It must not, however, be forgotten that floating kidney is often complicated with typical hysteria. In dozens of cases presented to us as nervous affections, we have been able to at once diagnose floating kidney; but, nevertheless, we hesitate to make the latter responsible for all the symptoms of such affections.

The most important *objective* symptom of renal displacement is the discovery of floating kidney itself. The best method is a careful, repeated *bimanual* palpation (*Landau*), at first in the dorsal position with the legs drawn up, and then in other positions (standing, and that which we especially recommend, viz., sitting down and genu-brachial position); and, finally, repeated dorsal position, if necessary under anæsthesia.

Weil has proved the impossibility of demonstrating the limits of the normal kidney by percussion. Consequently, too much importance must not be attributed to changes of appearance of the lumbar region, to modifications in percussion, even after replacement of the organ. We have given minute attention to the examination of these phenomena, but we have but seldom met with flattening and hollowing of the lumbar region observed by the best authors, and we must say the same with regard to the results of percussion, a method recently so warmly advocated by *Riess*. Even *Zülzer's* method of "percussorische Transsonanz" (auscultation of the abdomen during percussion of the renal region) has not demonstrated any important changes.

The floating kidney appears on palpation to resemble an elastic, smooth tumour, apparently larger than the kidney, which, when the patient has been standing for some time, appears under the ribs, or even descends into the pelvic cavity. The shape of the kidney is seldom ascertained, and palpation of the renal artery is even more exceptional. *Eichhorst* and *Frerichs* have nevertheless succeeded in feeling its pulsation.

On the left side, one must bear in mind that the spleen may be displaced (wandering spleen).

If so, the diagnosis presents great difficulties. *Dittel* took a tumour seated above *Poupart's* ligament for a floating kidney, on the strength of pyonephritic symptoms; he performed an operation, and discovered post-mortem that the tumour was a floating kidney complicated with pyelonephrosis.

The floating kidney is usually tender on pressure, the pain resembling that produced by pressure on the other kidney (*Trousseau*) or the testis (*Gerhardt*). *MacEvans* observed vomiting after palpation of the displaced organ. We have never heard

patients describe the pain produced, intense as it is, in a definite manner; we have even often been struck at the tolerance with which some of them bore palpation. *Nagy* describes the case of a woman who experienced a pleasant sensation at the moment when she drew her floating kidney out of the depths of her abdomen to let the physicians feel it.

In a case observed by us, it happened that, after several years, the displaced organ could not be discovered, and that the pain was considerably diminished. Temporary disappearance during days, or even weeks, of the floating kidney, is known to every physician of fair experience.

The lady has since died from contracted kidney, and the post-mortem showed the former floating kidney as a small hydro-nephrotic cyst with trifling cirrhotic remains of the renal parenchyma.

As *Landau* has shown, *decrease of urine, temporary albuminuria, and hæmaturia*, phenomena without doubt consecutive to flexion or ureteral torsion, are not rare with acute hydronephrosis. *Pribram* noticed under such circumstances anuria and uræmia. *Apolant* observed the contrary, that is, intense polyuria and polydipsia in a case of ectopia, which ceased after replacement of the organ.

Gastrectasis and *jaundice* were considered fairly frequent complications of floating kidney; they are supposed to develop mechanically, especially through direct compression of the descending portion of the duodenum (*Bartels*). This theory has rightly not found many followers (*Landau, Oser, Grant*). It is probable that for dilatation of the stomach, granted that it is not itself the cause of ectopia, it rather refers to an unexpected coincidence. *Schütz* even saw dilatation of the stomach disappear when the bandage was *removed*. Regarding jaundice, *Lindner* remarks that in a case of this kind the displaced kidney had never been in contact with the ductus choledochus; at the most, a torsion with flexion of the duodenum, stasis and catarrh were in question. In this case jaundice disappeared after laparotomy without nephrectomy.

We do not believe that a floating kidney can affect the large intestines and the vena cava to such a degree as to produce obstinate constipation and œdema of the lower extremities.*

Special importance must be attributed to *Dittel's* phenomena of "incarceration." They appear with rigor and terrible pains in the abdomen; their course is that of acute localized peritonitis with abundant exudation, which is of an exceedingly threatening

* *Landau* mentions a case of floating kidney recorded by *Girard*, and one of a movable kidney which he himself observed. In both these cases œdema of the lower extremity was caused by a pressure on the veins. In *Girard's* case an actual thrombosis of the vena cava inferior was found. *Rollet* cites a case in which obliteration of the vena cava inferior had been caused by the pressure of a dislocated kidney.—W. H. G.

character. This train of symptoms often follows bodily exertion. The region round the floating kidney is in such cases the seat of hyperæsthesia when pressure is exerted; as concomitant symptoms, nausea and vomiting, serious dyspeptic troubles, a feeling of uneasiness, oliguria, which even leads to anuria, must be specially mentioned. Hence this condition is often taken for renal colic.

We have usually observed fever, a fact, however, seldom or never mentioned in books. The disturbances cease in about a week; their cessation is usually marked by copious diuresis, and sometimes by pyuria—at least, when the replacement of the kidney takes place at an opportune moment.

The pathogenesis of these symptoms probably involves various causes; doubtless the explanation formerly given, that the peritoneum is irritated through sudden displacement of the kidney, holds good in the minority of cases. Sometimes obstruction of the ureter through torsion, with consecutive acute urinary stasis and pyelitis, plays the principal part (*Gilewski*); at others, circulatory disturbances produced by torsion of the renal vein (*Landau*); finally, in some cases the development of acute nephritis and pyelitis, with secondary obstruction of the ureter by blood-clot (*Mosler*).

We have often, after the subsidence of acute symptoms, found the kidney fixed in an abnormal position, and we are of the opinion that localized peritonitic exudation has to do with this fact.

Diagnosis.—The diagnosis is based on the aforementioned etiological factors and subjective symptoms. It is hardly possible to confound floating kidney with the "phantom tumours" so frequently found in hysterical patients, and produced by localized contractions of the abdominal muscles. When necessary, anæsthesia may be employed.

Differential diagnosis from *wandering spleen* is often difficult. We know of a case, diagnosed as floating kidney, in which wandering spleen was only recognised during the operation. Coils of intestines never lie in front of the spleen. Compare *Dittel's* case. The most frequent mistakes are, as *Buret* rightly mentions, cancer of the stomach, tumours of the gall-bladder, tumours of the lymphatic gland, perityphlitis, intestinal cancer, and pedunculated fibroma of the uterus. The difficulties of diagnosis in these cases may become insurmountable when, owing to adhesions, the displaced kidney cannot be mobilized.

Deipser observed an inguinal hernia which contained a floating kidney.

We cannot strongly recommend *Simon's* method of rectal palpation.

Prognosis.—The prognosis is *quoad vitam* favourable. Death as a direct consequence of the morbid condition without compli-

cation is unknown. But complete recovery is exceptional except in quite painless cases.

Trousseau rightly remarks that the diagnostic errors to which floating kidney gives rise somewhat obscure prognosis. In some cases nervous disturbances have so much impaired patients' general health that the most rational treatment remains without result.*

TREATMENT.—The first thing on recognising the disease is to point out to the patient the comparative harmlessness of the complaint; at the same time, too much must not be expected from this assurance. Then it must be decided how much is to be attributed to the floating kidney itself, how much to the causal factors. The mental attitude of the physician must also be taken into consideration. Pleased with his discovery, he may impute all subsequent symptoms to the movable kidney (*Landau*).

The first indication is to replace the organ (in cases of enteroptosis), and to endeavour to fix it in its normal position by means of bandages, which must be worn for a long time. This is very difficult; in spite of every care to avoid physical exertion, and of the strictest attention to the state of the bowels, the *corpus delicti* frequently slips back into its old abnormal position. Instead of the corset formerly recommended by him, and which reached to a point just above the symphysis, *Landau* now recommends a "ceinture hypogastrique" (to be obtained from *Pfau* in Berlin), which indirectly supports the kidney, *i.e.*, by the intermediate pressure of the abdominal viscera. All bandages with pads which press directly on the kidney are to be avoided; they encourage enteroptosis. *Niehaus* recommends a double truss, which is supported by the pelvic girdle (but not by the posterior part), and which supports the kidney region by means of a jointed spring supplied with a pad.

The recumbent position (dorsal decubitus) usually leads to rapid improvement, and if the patient can remain in this position long enough, there is a chance of the kidney remaining in its proper place. Unfortunately, patients will not submit to prolonged confinement in one position.

* *Ralfe* (*op. cit.*) observes: "Opinions differ widely as to the importance and dangers of movable kidney, and, as fairly typical, we may take those of *Keppler*, *Newman*, and *Landau*. The first considers the condition fraught with so much danger, not only to the comfort, but even to the life of the patient, that he would, on its producing any symptom whatever, at once, and notwithstanding the absence of any complication, extirpate the organ by an abdominal incision. *Landau*, on the other hand, denies that movable kidney has ever caused death—nay, he says in a fair proportion of cases it tends to a spontaneous cure, and that in no case is operative interference, much less extirpation, justifiable. *Newman* takes his place between these two extremes, and the cases adduced by him, although few in number, go far to justify his position. In many cases the condition produces no symptoms, and therefore requires no treatment; in a considerable proportion of the remainder the symptoms can be relieved by simple means; in a few cases severe symptoms occur which can be relieved only by operative measures, and even as a last resort by nephrectomy."—W. H. G.

To strengthen the weakened abdominal walls, baths, electricity, massage, and, above all, plentiful food, should be employed. The Weir-Mitchell treatment, again lately recommended by *Nothnagel*, gives good results, especially when the disease is accompanied by nervous disturbances. It does not, however, lead to complete recovery.

For the *neuralgic* pains, warm baths and narcotics are indispensable. *Grant*, who believes that the troublesome symptoms arise from the sympathetic centres, strongly advocates codein, the specific action of which lessens the irritability of the nerves which supply the abdominal viscera.

Attacks of so-called *incarceration* call for the ordinary treatment of peritonitis, after a careful attempt to replace the floating kidney has been made. If this attempt be not rapidly successful, the best course to pursue is to regard the exceedingly sensitive region as a *noli me tangere*. Experience has taught us that continuous local manipulations, with or without anæsthesia, only injure the patient. Sometimes the violence of the disturbances and the abnormal fixation of the kidney are followed by complete permanent suppression of the morbid manifestations.

It is a question of great importance whether excision of the floating kidney is justifiable—of course, when the healthy condition of the corresponding organ is proved. Some authorities (*Martin, Keppler, Czerny, König, Langenbuch, Hennig, Polaillon, Kispert, Lindner*, and others) reply on this point in the affirmative, having obtained successful results; others, headed by *Landau*, speak very decidedly against excision of a sound floating kidney, an operation, they say, only undertaken by individuals with a mania for operating. They base their view on the favourable prognosis *quoad vitam* in non-complicated ectopia.

Obviously, the eventual danger which might arise should the other kidney become diseased must be taken into consideration. According to *Hager*, nephrectomy favours lithiasis of the remaining kidney. *Brodeur's* statistics (1886), which show only eighteen successes in twenty-six excisions, contain an important warning. It must be borne in mind that the disease can be scarcely considered as dangerous, and, moreover, that all the cases of excision which end fatally are not published. On the other hand, the fact that the patient is incapacitated from work must be taken into consideration.

All facts being taken into account, the operation is only justifiable when the pain is unbearable, and when other therapeutic measures have failed (*Bardeleben, Lindner*).

Under these circumstances, we gladly welcome *Hahn's* "nephrorraphy," or suturing the kidney to the abdominal wall, an operation which daily gives good results (*Newman, Ghinozzi, Braun, Lauenstein, Doyen, Terrillon, Rosenberger*, who fixed the organ in an intraperitoneal manner; as also *Schede* and *Kümmell*

in some cases). *Brodeur's* statistics, already frequently referred to, show nine successes in ten cases of nephrorraphy. The originator of the operation (oral communication) has a total of twenty cases of nephrorraphy (sixteen patients). Five were apparently completely cured, six considerably improved. *Frank* gives fifty-six cases of nephrorraphy, and discusses the results obtained and the technique. The question as to the justification and value of this operation, which is almost free from danger, and is in no way mutilating, may therefore be considered as settled. The operation itself was always successful. In one case alone death occurred two days after, but it was probably not as a result of the operation.

These results, which may be accepted with the greatest confidence, are sufficient to convince the most sceptical. *Landau* regards nephrorraphy as based on erroneous anatomico-pathological principles, and he believes that in successful cases the symptoms were as probably due to hysteria as to actual floating kidney, and he still reserves his opinion on the point. Experiments on animals (*Bassini, Vanneufville*) and anatomical observations on the human body (*Langenbuch, Kümmell*) demonstrated the impossibility of permanent fixation of the kidney by nephrorraphy.

When floating kidney is complicated with hydronephrosis or pyonephrosis, *Landau, Schramm*, and others recommend partial removal of the cyst, and, when necessary, creation of a pyelo-abdominal fistula. For details on this point, which does not offer the dangers of total excision, see "Treatment of Hydronephrosis."

When the floating kidney is diseased, operative interference is the same as in renal affections in general. Cases are recorded of successful removal of cancerous floating kidney, cystic or calculous kidneys, etc. (*Walther, Orlowski*).

We have already mentioned that, in a number of cases in which nervous affections have been present for years, surgical treatment is of no avail, and that therapeutic measures can only be of use for the general treatment of hysteria or the accompanying neurasthenia and hypochondriasis. Only a meddlesome practitioner would think of treating a floating kidney when the condition is associated with serious primary disease (locomotor ataxy, etc.), as *Landau* rightly remarks.

The condition of *permanent displacement* of the kidney, in consequence of embryonic and developmental abnormalities, must be distinguished from floating kidney proper. One kidney only is usually affected—most frequently the *left* one; its position with regard to the spine may be as far down as the promontory

and the organ is in a fœtal condition. This deep position of the viscus has but little clinical interest.

To this class belong the genuine and compensatory hypertrophy of the organ, due to diabetes mellitus and insipidus, and in cases where one kidney only is present, or where lesions of the other kidney exist; further, in cases of horseshoe kidney, congenital deficiency (defects and rudiments) of the kidney, supernumerary kidney, and in cases of double renal pelvis, ureter, etc.

Cases in which these abnormalities (all observed by us in the cadaver) offer any clinical importance are so rare that we consider it superfluous to enter into details as to the history of their development. On this subject of great histological importance the readers should refer to manuals on pathological anatomy.

DISEASES OF THE BLADDER.

CYSTITIS.

Vesical Catarrh, Inflammation of the Bladder.

Etiology and Pathogenesis.—Cystitis may be acute or chronic in its onset and course. It most usually attacks the middle-aged and the old, and shows a marked predilection for the male sex (prostatic gland). Its causes are very numerous, and to a great extent similar to those of pyelitis. They may be divided into five distinct groups:

1. *Injury and Irritation.*—To this group belong calculi, unskilful or too frequent catheterism, cystoscopy, operative interference (stone, gynæcological and obstetrical operations), blows in the vesical region, compression, contusions, especially during labour, but also during pregnancy, by pressure of the fœtal head, pelvic tumours, intentional or unintentional injections of irritating substances into the bladder (irrational treatment of vesical neurosis, gonorrhœa, etc.—many a physician has a therapeutic cystitis on his conscience), exaggerated distension of the organ by urinary obstruction, through some cause or other, especially when it is followed by a sudden depletion, neoplasms of the bladder, excessive doses of balsams, cantharides, and other irritating diuretics. We do not mention quinine, iodide of potassium, and morphia, the internal administration of which does not seem to us to have an inflammatory effect. We do not agree with text-books which regard the increase of normal elements of urine (uric acid, phosphates, etc.) as a possible cause of cystitis. Finally, transient vesical irritation, due to drinking badly fermented beer and sour wine, need not be taken into account in this place.

2. *Urine in a State of Ammoniacal Fermentation, and other Bacterial Infection.*—This etiological factor, which is of the

greatest importance, only partially belongs to the first group, for it is rare that *cystitis* produces fermentation. Two elements must be taken into consideration: the products of the decomposition of urea, *carbonate of ammonia*, and *bacteria*—inseparable companions of urinary fermentation. Thus, we have two factors, *chemical irritation* and *infection*.

Entire accord does not exist with regard to the mode of development of the alkaline fermentation of urine, except, of course, with regard to that which is due to carbonate of alkalies and vegetable alkalies; nevertheless, it cannot be disputed that ammoniacal decomposition of urine can only take place through the intervention of an organized ferment (*Pasteur*). The old theory of the fermentative action of the vesical mucus is no longer sustainable. *Stagnation* of urine, a very important and frequent symptom, is of itself an insufficient explanation.

Urine in the pelvis of the kidney of a dog does not become alkaline when the ureter is ligatured (*Cohnheim*). On the other hand, micro-organisms, amongst which is *Cohn's* "*Micrococcus ureæ*," play a considerable part (*Pasteur, Van Tiegheim, Von Jaksch*, and others). *Leube* and *Graser* have recently discovered a great variety of these microbes by means of cultivation. These bacteria, which cause the decomposition of urea, are small bacilli of a prodigious activity, micrococci, various-shaped bacteria, pulmonary sarcinæ—one or the other of which, as *Müller, Rosenstein* and *Gutzmann* have shown, are able to decompose neutral sulphur—together with many other representatives of the lower-form plant-life. These may be considered as "air-fungi," by reason of the decomposition which they induce in all normal urine exposed to the air.

Whether bacteria, as such, or their products, produce fermentation as chemical ferment is in our opinion a question of subordinate clinical importance.

The question has been recently thoroughly studied, especially by *Leube*, who inclines towards the first hypothesis; *Lépine* and *Roux* have given a complete experimental demonstration of the effect of the best known of the aforementioned micro-organisms. They have succeeded in producing ammoniacal fermentation of urine, cystitis, and nephritis by injecting pure cultures into the urethra of healthy guinea-pigs, and by occlusion of the same. Injection of a liquid containing bacteria into the bladder of dogs does not produce alkaline fermentation, as the emission of the contents of the bladder, by repeated micturition, deprives the schizomycetes of their nutrient soil; this is a fact which, in our opinion, cannot be denied, although the above-mentioned authors have seen ammoniacal fermentation, together with persistence of the acid reaction of the urine. If, on the other hand, the urethra is ligatured, and stagnation of the urine produced, ammoniacal fermentation will occur (*Cohnheim*).

Analogous processes probably occur in human pathology. Nevertheless, as *Leube* has proved by the examination of urine voided under mercury that *normal* human urine contains neither bacteria nor germs of bacteria, it is doubtful whether, under normal circumstances, penetration into the urine of agents of fermentation contained in the blood takes place by way of the glomeruli.

We must therefore return to an *immigration* of agents of fermentation, in order to explain the primary basis of ammoniacal fermentation of urine, and nothing is less proved than spontaneous intravesical decomposition of urine, so popular with some authors.

Guyon's recent communications confirm *Cohnheim's* theory regarding the conditions necessary for the efficient entrance of micro-organisms into the bladder (ureter and kidneys). According to *Guyon*, the chief factor is the incomplete retention of urine, with distension of the bladder and the accompanying "cachexia urinaire," while acute complete retention, on the contrary, creates conditions less favourable to this bacterial invasion, in consequence of immediate therapeutic interference giving free passage to the urine.

But even without ammoniacal decomposition, cystitis may take place by bacterial infection. In spite of some ineffectual attempts at cultivation, nothing very precise is known regarding the agents which cause this cystitis. To avoid misconceptions, we should like to call them "direct cystitogenous micro-organisms." With regard to mixed conditions in cystitis gonorrhoica, we are equally unenlightened, and obliged to be content for the present with clinical observations, and they seem to indicate that the modes of infection in these cases are manifold.

It cannot be doubted that the short female urethra offers entrance to schizomycetes from the vulva and the vagina; furthermore, that injuries to the bladder, combined with *suppuration*, and, further, the rupture of abscesses, afford most favourable opportunity to the entrance of these micro-organisms. Most frequently, however, the germs penetrate into the bladder, by means of dirty instruments, especially by insufficiently disinfected catheters (*Traube, Teuffel, Van Tiegheim*). Thus, as catheterism is only used when micturition is impeded, we are in the presence of the essential conditions necessary for ammoniacal fermentation of urine, viz., stagnation.

Nevertheless, gynæcologists and accoucheurs declare that a completely aseptic catheter may help to produce cystitis by the introduction into the bladder of vaginal secretions, lochia, etc. (*Küstner*). But in these cases infection is far from being constant (*Fritsch*), sometimes decomposed pus producing inflammation, sometimes lochia entering the bladder without bad results (*Pincus*). *Bumm* attributes puerperal cystitis to invasion of the bladder by micro-organisms, similar to gonococci, carried

in by the catheter, the bladder being in an irritated condition due to parturition. When the organ is in a normal state, as *Kaltenbach* argued some time ago, there is hardly reaction to infection.

Besides this kind of puerperal cystitis, there is another caused by special micro-organisms, and remarkable for its intermittent course, rapid extension towards the kidneys, and horrible fœtid odour of the urine.

3. Cystitis may result from the *extension of inflammation* of adjacent organs. Perhaps it is erroneous to separate this mode of development from that which we have just studied, for in none of these cases does urine remain free of bacteria (*Mircoli*). We have investigated this subject, and have found that in the chronic forms of cystitis, those belonging to the first group excepted, micro-organisms in the sediment have only been temporarily absent; but cultures have always been successful. Bearing in mind that many of the bacteria observed merely accompany the others, without giving rise to effects themselves (*Jamin*), we are, notwithstanding, tempted to attribute the chief *rôle* to the infective factor. This is particularly the case with cystitis consecutive to gonorrhœa, probably when it is due to *mixed infections* (*Bumm, Finger*). The development is doubtless as follows: The gonococcus, so to say, prepares the tissues for the invasion of a second micro-organism, *Staphylococcus pyogenes*. We must imagine that the cystitic cocci find their way through the pus, which fills the gonorrhœal urethra. Forced injections seem even more injurious than catheterism (*Leprévost*). The gonococci are in a minority. In fact, in gonorrhœal cystitis the number of gonococci is infinitely smaller than that of the other schizomycetes. Nevertheless, we have met with fairly numerous exceptions, which force us to the conclusion that a gonorrhœal cystitis caused directly by gonococci may exist.

Not only may inflammation of the urethra, even when of a non-specific nature, become dangerous for the bladder, but the prostate, the female genital organs, the rectum, the peritoneum, the pelvic cellular tissue, the renal pelvis, and exceptionally the kidney itself, may lead to infection (see "Pyelitis" and "Nephritis"). Symptomatic vesical catarrhs resulting from neoplasms of the bladder or the neighbouring organs may also be included.

4. Cystitis appears frequently as a complication in general *infectious diseases*, such as puerperal fever, pyæmia, typhus, small-pox, dysentery, cholera, acute rheumatism. The cystitis met with in gout must doubtless be considered as absolutely bacterial in origin. In certain cases the development of infection finds a favouring factor in excessive somnolence accompanied by an insufficient urinary evacuation. As in pyelitis, the inflammation may appear in the croupous and diphtheric forms. Occasionally the condition is one of interstitial cystitis.

5. Inflammation of the bladder is observed in nervous diseases,

especially in *paralysis* or paresis of the bladder resulting from cerebral and spinal affections, but also from irritation of the vesical nerves alone. *Charcot* considers it possible that the development of cystitis through *trophic* influence is just as possible as that dermatitis (zoster, etc.) is attributed to a nervous origin. But it is evident that, in the majority of cases, urinary stagnation, consecutive to paralysis of the bladder, and catheterism in combination with paralysis, plays the principal part. On the other hand, a minimum action of these factors is generally sufficient to lead to cystitis. The decomposition of urine usually takes place in the

FIG. 5.—URINARY SEDIMENT IN CYSTITIS WITH AMMONIACALLY DECOMPOSED URINE.

bladder after having shown an acid reaction. The urine collected by means of the catheter immediately after the ammoniacal contents of the bladder have been evacuated, and after the bladder has been washed with a disinfectant, has an acid reaction, as *Ultzmann* has demonstrated. Nevertheless, one must not infer from such experiments that urine contained in the renal pelvis is never met with in an ammoniacal condition.

It would be utterly disregarding facts to pretend that cystitis with ammoniacal fermentation of the urine is of rare occurrence in individuals of the last-named class *without catheterism*. Our personal experience, which increases from year to year, proves that

cystitis often develops before the catheter has been used. In the absence of a better explanation, we admit in these cases that decomposition of urine is "cryptogenetic," but not "spontaneous."

It is now opportune to discuss *Aufrecht's* experimental diphtheria of "the bladder without external infection." This observer occluded the præpuce of a rabbit with sticking-plaster. The animal passed hæmorrhagic and ammoniacal urine, and showed at the autopsy diphtheritic membranes of the bladder containing cocci. We have said enough previously to justify the conclusion we draw from this experiment—that microbes are present in the organism, but they only exercise an injurious effect under special conditions (great increase in number). On the other hand, we especially insist on the fact that diphtheria, produced by *Heubner* by means of temporary aseptic ligature of the bladder near the urethra, is originated by means of inflammatory alteration of the vascular walls and by means of coagulation necrosis.

It has neither been proved nor rebutted that a *severe chill* may produce cystitis by means of circulatory disturbances ("rheumatic cystitis").

Fritsch and *Ultzmann* rightly remark that cystitis is rare in children, who are so liable to take cold. *Bokai* only admits the influence of a predisposing cause. Latent gonorrhœa certainly plays here an important part; it leads to exacerbations as a consequence of chill, and causes an apparently primary cystitis (*Berkeley-Hill, Ultzmann, Aubert, Desnos*, and others). According to our somewhat large experience, *primary* cystitis must only be accepted with great reserve, although we know of cases where the affection was immediately connected with a severe drenching, and where another cause could not be discovered.

The connection of vesical catarrh with gout and food excesses is most contestable. On the other hand, tuberculosis and scrofula create a marked predisposition (see "Vesical Tuberculosis").

In certain cases of cystitis, the most careful study of the circumstances does not reveal the influence of any etiological lesion. In such cases the condition is called "idiopathic"; thanks to the progress of diagnosis, their number decreases every day.

We do not agree with the opinion expressed in many manuals, that sexual excesses and masturbation can alone induce cystitis.

Pathological Anatomy.—The pathological and anatomical lesions of cystitis so much resemble those of pyelitis that we shall discuss them very succinctly. The distinction which many authors make between inflammation of the mucous membrane, *i.e.*, vesical catarrh, and genuine cystitis is on the whole imaginary.

The most simple form of *acute* catarrhal cystitis is characterized by redness, tumefaction and softening of the mucous membrane. Hyperæmia is uniform, striated, especially above the folds, punctiform, mostly complicated with ecchymoses. It either affects the whole of the internal surface, or it may be partial. When it

proceeds by extension from the urethra, it becomes localized chiefly in the region of the follicular meatus urinarius and in the lower part of the organ.

In *chronic* catarrh the mucous membrane is of a reddish-brown or slate colour. Contrary to *Englisch's* opinion, the tissues are very seldom anæmic, but are more frequently markedly hyperæmic, great dilatation of the veins being often present, especially towards the vesico-urethral orifice. When the bladder is emptied, the surface of the mucous membrane is seen to be covered with more or less yellow pus.

The mucous membrane and the submucosa are the seat of cellular infiltration and hyperplasia. Granulations resembling lymphoid tissue may also be seen. These granulations have a very decided tendency to become localized about the trigone, and to prepare the way for cystitis granulosa, nodosa, follicularis. *Chiari* considers them as morbid attributes of catarrh, and not as physiological phenomena, as *Weichselbaum* thought. *Przewóski's* recent researches corroborate this view. The latter has also shown that this morbid alteration of the tissues, which gives the catarrh a special character, may result in fatty degeneration and ulceration. The presence of superficial erosions is fairly frequently met with. Deeper ulcerations only belong to the simple chronic form (*vide infra*).

When inflammation affects intensely all the vesical membranes to a marked degree (interstitial, parenchymatous, phlegmonous cystitis), it often leads to purulent infiltration of the submucous, intermuscular, and subserous connective tissues, with formation of abscess. These abscesses may burst into the perivesical cellular tissue, and constitute "pericystic" centres of suppuration. They may also rupture into the rectum, the vagina, the abdominal cavity, and into the bladder itself. Adhesions between the bladder and adjacent organs are the rule, and cicatricial contraction which diminishes the capacity of the viscus often results. The description of the numerous varieties of these extra-vesical abscesses, especially of the prevesical abscesses, recently also described by German authors (*Leusser*, *Pinner*, and others), does not come within the scope of our subject, as the most interesting forms are precisely the "idiopathic" ones which, from an etiological standpoint, have nothing to do with cystitis.

What we have said of the corresponding kinds of pyelitis applies exactly to the *croupous* and *diphtheritic* forms of cystitis. A fact worthy of notice is that, according to *Maas* and *Stüler's* experiments, the coagula in experimental cantharides cystitis are for the most part composed of pavement epithelium. Marked cases of vesical croup during confinement have been recently described by *Maglieri*.

We must be careful not to look upon every dirty membrane seen on vesical ulcerations as genuine diphtheria, especially in cases

where ammoniacal decomposition of stagnating urine is present, as this has a tendency to produce necrosis of the mucous membrane.

In extreme forms, mostly accompanied by pyelitis and pyelonephritis, the whole of the vesical wall becomes infiltrated, accompanied by hæmorrhagic processes. After washing out the fœtid contents, which contain brown discoloured shreds, a more or less pulpy disintegration of the surface may be seen. When the mucous membrane is still healthy, incrustations of triple phosphates and of calcium salts, looking like emery-paper, are observed.

We have frequently noted detachable lime scales. *Brodeur* and *Durand-Fardel* have seen these scales lead to complete obstruction of the urethral orifice, terminating in death. In one of our own cases the greater part of the internal surface of the bladder was coated with a substance like parchment, which could be readily peeled off. This coating was entirely composed of pavement epithelium with a few cholesterine scales.

We must also allude to gangrene of the bladder, or exfoliative cystitis, numerous instances of which have been recorded by modern accoucheurs. The condition is due to retroflexion of the gravid uterus. The disease does not, strictly speaking, come under the head of cystitis. *Krukenberg* shows that these cases are not so rare as is thought. We mean a genuine gangrenous sloughing leading to the elimination of the mucous membrane with part of the tunica muscularis.

In other cases, when the vesico-intestinal adhesions are well developed, rupture of the bladder occurs, and the urine and pus escape in different directions; furthermore, peritonitis from perforation or abnormal communications with the intestines takes place. These kinds of necrosis are usually associated with the incrustations already described, and *loss of substance* usually occurs about the apex. The observations of *Harry*, *Boldt*, *Burger*, *Macan*, *Oettingen*, *Lancereaux* and *Schatz* prove that they are also found in cystitis following severe injuries; during the puerperium —at least, after the use of instruments (forceps, etc.); after exaggerated distension of the organ under the influence of diverse causes; after unskilful catheterism; through septic conditions of all kinds.

To these may be added *ulcerating destructive* processes of a purely traumatic origin. They are due to lesions produced by instruments (permanent catheter, etc.) and concretions (*cf.* cystolithiasis), and are localized to the base of the bladder, and may even perforate the muscular coat.

When the free passage of urine is for a long time impeded— although unconnected with cystitis — the muscular coat often becomes intensely hypertrophied, thus producing thickening of the vesical parietes, which may reach two centimetres. Fascicula-

tion of the bladder becomes marked (*vessies à colonne*). Notable dilatation of the organ is usually a concomitant phenomenon. This constitutes the so-called *excentric hypertrophy of the bladder*, in distinction to *consecutive hypertrophy*, which is often accompanied by a decided contraction of the cavity. Inexperienced physicians are often deceived by the thick walls a normal bladder always has when contracted.

It only now remains for us to say a word on *vesical sacculation*, which proceeds equally from obstacles to the passage of urine, and usually appears at the apex and about the sides of the viscus. The secondary pouches, which sometimes attain to the size of a fist, often contain concretions, and sometimes give rise to perforation, with the consequences already described. Contrary to the congenital forms, which involve all the layers of the bladder wall, we have in this case to do with a genuine hernia of the mucous membrane through the muscular trabecula (*Robelin*).

Symptoms.—In certain cases, *acute* vesical catarrh is ushered in with a rise of temperature, rigors, followed by fever of an irregular course, and the intensity of which varies according to the degree of inflammation and the idiosyncrasy of the patient. But more often the temperature remains normal.

The most constant *subjective* symptoms are *pain* and *strangury*. When the catarrh is localized to the neighbourhood of the urethral opening and in the trigone, the pain is usually most severe in the perinæum, but if the urethra is involved in the inflammation, the pain is then worst in that situation. When the cystitis is general, pain is also felt in the region of the body of the bladder, viz., above the symphysis. Local pressure increases it, and occasions strangury. Pain is either constant or remittent, and generally bearable; it frequently radiates towards the loins, the side, and even the testes.

The other cardinal subjective symptom, viz., *painful strangury* (dysuria, tenesmus ad matulam), evidently does not constitute a pathognomonic attribute of cystitis, which may originate from various irritations of the posterior segment of the urethra and of the vesical orifice. With *Finger*, we do not feel justified in using the term "neck of the bladder," a designation which leads more and more to unpleasant mistakes, as it has been given up in the sense formerly used, that is, as meaning that segment of the urethra which lies between the compressor urethræ and the urethral opening (*vide* "Gonorrhœa"). Neither part has the shape of a neck, which can only be formed by the urethral segment through excessive dilatation. It leads to a normal constant necessity of passing urine with great pain. The pathogenesis is clear; we know that physiological micturition results from contraction of the detrusor muscle, a contraction for which *Bechterew* and *Mislawsky* recently discovered a cerebral centre in the part of the optic thalamus adjoining the cortical centres. Emptying of

the bladder takes place through reflex action produced by stimulation of the vesical parietes—a stimulation depending on the fulness and tone of the organ. The capacity of the bladder, the rapidity with which it fills itself, but also individual habits, determine the frequency of micturition, which even varies very greatly in one and the same individual. Whether it be the stimulation of the sensory nerves of the mucous membrane which causes reflex action, or, as *Guyon* opines, the painful distension of the muscular coat, and not the stimulation of the insensitive mucous membrane of the bladder in morbid conditions, the frequent and painful micturition depends on the irritation of the sensory nerves of the bladder by inflammation of the mucous coat. Contraction of the detrusor goes hand in hand with spasm of the sphincter—the nerve fibres of the internal sphincter being conducted through the detrusor centre situated in the lumbar portion of the spinal cord (*Born*)—and is also the result of inflammation. This spasm is increased, especially in the male sex, by contraction of all the urethral and perineal muscles (also of the sphincter and levator ani); hence the possibility of only being able to pass a few drops of urine at the time, the "struggle" between the desire to micturate and incomplete evacuation (*Lebert*).

Sometimes complete strangury (inflammatory ischuria) occurs, with considerable swelling of the mucous membrane of the neck of the bladder. This condition is most excruciatingly painful, and may lead to intense distension of the bladder up to the middle of the lower part of the abdomen. We have most frequently observed this acute strangury in cases of gonorrhœal cystitis treated in the out-patient department, and quite independently as to whether total inflammation of the mucous membrane had taken place, or whether posterior urethritis with accompanying cystitis had existed (*Finger's* urethro-cystitis, "cystite du col" of French writers). For simple posterior urethritis, see chapter on "Gonorrhœa."

Strangury during the night and day remains the principal subjective symptom. It is also present in most forms of *chronic* vesical catarrh, whether it has developed from the acute form, or primarily and insidiously; the intensity is sometimes so great that the unhappy patients are obliged to micturate constantly, and are thus unable to remain any length of time in company or to travel. Other pains (provided cysto-lithiasis does not exist) are much less pronounced; in some cases the patients are scarcely inconvenienced. This, however, is no reason to distinguish *indolent* from *painful* forms of cystitis, as French authors do. This distinction is all the more erroneous, as transitional conditions may exist from time to time in the same individual.

The disease lasts months and years, varying in intensity, improving in summer, increasing after bodily exertion, taking cold,

and venereal excesses. Then, again, there are periods of incomplete retention of urine, accompanied by gradually increasing dyspepsia and obstinate constipation. It is obvious that emaciation and weakness result more frequently from pain and sleeplessness than from the loss of matter, which is so often incriminated.

Simple chronic catarrh cannot produce either intense weakness or dangerous exhaustion. It only becomes fatal through serious complications, such as extensive ulceration, diphtheria, gangrene, formation of abscesses, perforation, infiltration with urine, strangury with ammoniacal fermentation, the so-called ammoniæmia or other still obscure "autochthonous intoxication" (*Senator*), renal suppuration, tuberculosis, etc.

The *character of the urine* in cystitis is of great importance. Our personal observations force us to contradict those who declare that in slight cases the urine contains mucus only as a pathological element. As characteristic of the catarrh, we have always observed, even in merely turbid urine, large quantities of pus corpuscles, besides mucous corpuscles and epithelium cells, especially of the large pavement kind. In such cases albuminuria is frequently not diagnosed, because the dissolved albumin is in such small proportion. Sometimes the pus corpuscles show amæboid movements (*Munk, Michelson*).

The more advanced degrees of purulent catarrh furnish abundant sediment several centimetres in thickness. *Bacteria* are seldom absent even in freshly-passed urine. As the urine in cystitis has a decided tendency to ammoniacal decomposition *outside* the body even when strongly acid (sometimes the decomposition takes place in less than an hour), it often leads to the conclusion that alkaline fermentation has already taken place inside the bladder. Thus, freshly-passed urine only must be examined to determine its intravesical condition.

In a certain number of cases of acute and chronic vesical catarrh, *hæmaturia* is present, which, however, keeps within moderate bounds. We are not inclined to believe in its urethral origin (*Horovitz*), although in certain gonorrhœal forms we must allow that the urethra participates. The presence of blood is generally evident after the urine has stood some time, by the appearance of a red layer above the pus, visible as a well-defined line of separation at the side of the vessel.

The quantity and specific gravity of the urine offer no characteristic modifications. The proportion of albumin usually corresponds, but not always, with the quantity of pus or of blood mixed with the urine.

In cases of ammoniacal decomposition, the well-known *muco-gelatinous* product is found, the result of the metamorphosis of pus under the influence of ammonia. In these viscid masses, which are deposited like egg albumin at the bottom of the vessel,

and which sometimes, but seldom, create in the bladder obstacles to evacuation, the microscope reveals an intense swelling of the pus globules, the shape of which has partly disappeared in consequence of a veritable colliquation. Rhomboid crystals of triple phosphate are found eventually, as also amorphous phosphate of lime and urate of ammonium, which latter sometimes (Fig. 5) present a peculiar aspect.

In cases where diphtheritic ulcerations exist, discoloured incrusted shreds are met with, resembling those already described in the section on "Pyelitis." The very marked and persistent turbidity of fœtid urine, even after sediments have settled, is due to the presence of bacteria. The bad odour of the urine is evidently due to various kinds of bacteria. This is apparent to the physician and patient long before the ammoniacal fermentation has taken place.

An odour resembling that of beef-tea or meat-bones is very frequently observed; it is probably the result of decomposition of albuminoid matter, and is only concealed by intense ammoniacal fermentation.

One must not confuse viscid transformation of pus in ammoniacal urine with certain mucous ropy urines of acid reaction due to the influence of a special micro-organism recently studied by *Malerba*, *Sanna-Salaris* and *Melle*, and called *Bacterium glischrogenum*. The nitrogenous products of this bacterium have nothing in common with the processes of cystitis.

The volatile oleic acids partly arising from carbo-hydrates must also be considered as factors of the "urinous" odour in ammoniacal fermentation of urine, as shown by *Salkowski*.

In cystitis due to cantharides, pseudo-membranes tinged with blood and gelatinous fibrinous coagula are often met with, elements which we have already had frequent occasion to mention. Furthermore, it is not necessary to give an explanation of the intense tenesmus, leading to retention of urine, which occurs in cases of this kind, or of the renal pains accompanying strangury. *Robin* has recently described, as a symptom of reno-vesical cantharidism, peculiar attacks of screaming accompanied by fearful agony in the gastric and renal regions, in the urethra, and also at the time of micturition. Albuminuria disappears with cessation of the attack.

Gangrene or diffuse ulceration of the bladder, originating through severe traumatism in the course of septic diseases or through the breaking of new growths, gives rise to urine of a dirty brown, and even greenish, colour, due to the dissolved blood pigment, with a fœtid odour resembling putrefying meat, ammonia, and sulphuretted hydrogen. A silver catheter becomes black in such a urine.

Regarding the genesis of hydrothionuria, which, according to *Rosenheim*, only constituted an unimportant complication of cystitis, see p. 97. The thick turbid contents of the vessel

deposit a pulpy sediment in which the microscope shows the products of ammoniacal fermentation, and also abundant débris, as a result of the destruction of a great number of the formed elements.

The decided fœtid odour which the urine sometimes gives off without any admixture of fæcal particles (vesico-rectal fistula) has a special origin—viz., the diffusion of intestinal gases through the affected vesical wall.

Exfoliation of the mucous membrane of the bladder in consequence of gangrene, especially in cases of retroflexion of the gravid uterus, usually takes place gradually, and thus often escapes observation. It sometimes resembles an ordinary fœtid cystitis, or appears so suddenly that the expelled membranes have the form of membranous cysts. In a case observed by *Krukenberg*, where during some time small discoloured shreds were found in the fœtid urine, the patient passed, after retention of urine, a grayish-black membrane of nearly 400 square centimetres, with a distinctly recognisable internal and peritoneal external surface, with incrustations of ammonia salts. Similar observations have also been recently made. In these cases the comparatively large proportion of albumin—a proportion which does not account for the presence of leucocytes—results from a particular capacity for allowing transudation possessed by the mucous membrane, deprived to a great extent of its epithelium.

Rupture of the bladder following perforating gangrene is most frequently determined by distension of the affected walls under the influence of urinary retention. Awkward attempts at replacement may also cause this result, and it is nearly always followed by peritonitis. On the other hand, a decidedly favourable influence of these exfoliations on the chronic disease has been observed (*Buchanan*).

The symptoms of *vesical hypertrophy*, as observed in cases with prolonged obstruction to micturition, and especially in gonorrhœal stricture and hypertrophy of the prostate, vary according to whether they belong to the concentric or excentric form.

In the first case, the much-distended bladder presents itself above the symphysis as an egg-shaped tumour, and is sometimes visible, but always accessible to palpation and percussion. There is usually frequency of micturition. The completeness or incompleteness of the same depends on the most important compensation, on the degree of hypertrophy of the muscular fasciculi. Retention of urine, especially in old persons, leads to stillicidium (see "Paralysis of the Bladder").

The case is different with concentric hypertrophy; the bladder, in a state of repletion, may be reduced to the size of a small apple, and may be felt as a tumour through the vagina or rectum. This smallness of the lumen leads to incessant strangury with genuine "sychnomicruria" (*Moreau-Wolf*). Concentric hyper-

trophy, a complication which considerably influences the prognosis of vesical catarrh, is sometimes discovered when the bladder is washed out for the first time, and when the small capacity of the organ (sometimes only a few tablespoonfuls) produces after a few moments, under intense pain, a powerful evacuation of the injected liquid.

In connection with more acute forms of *retention of urine* without vesical catarrh, intense dilatation of the bladder *without* hypertrophy may develop. Such a sudden distension—the bladder, being a cyst with thin walls, may reach to the umbilicus, and quarts of urine may be drawn off by the catheter—does not occur without considerable injury to the muscular coat, reduced to the thickness of thin paper. Hence the *vesical atonia* so often observed with retention of urine may even lead to complete paralysis. This is the less astonishing as, even apart from the pathological state, too prolonged voluntary suppression of micturition may produce a functional deficiency of the detrusor muscles in consequence of their excessive distension.

The symptoms caused by the *interstitial* cystitis, which leads to the formation of abscesses (parenchymatous, phlegmonous), are much more intense than those of ordinary catarrh. In consequence of the purulent infiltration of the parietes of the bladder, and the adhesions formed by them with the neighbouring organs, the detrusor muscle loses the greater part of its contractibility. As a consequence, evacuations become incomplete, and almost continuous strangury persists as a sequel. Besides phlegmonous tumefaction, abscesses may obstruct the orifice of the ureters or urethra, and consequently retention of urine is capable of producing uræmic symptoms.

The symptoms of interstitial cystitis differ essentially from those of cystitis involving the mucous membrane, inasmuch as the former is generally accompanied by marked rise of temperature, interrupted by irregular rigors and by typhoid or pyæmic symptoms.

Rupture of the abscess gives rise to peculiar symptoms. When the rupture takes place into the abdominal cavity, peritonitis occurs, and generally leads to death. Perforation into the bladder determines a sudden amendment of the grave symptoms; the urine contains the contents of the abscess besides the primary purulent sediments.

When the abscess ruptures into the perivesical cellular tissues, the same become inflamed, and *pericystitis* ensues. Its presence is often revealed by percussion and palpation, in the shape of hard, inflammatory tumours in the abdominal and rectal region. Regarding the term "paracystitis," the same may be said of it as has been said when dealing with the terms "perinephritis" and "paranephritis." These tumours have a decided tendency to form abscesses in the scrotum and in the iliac fossæ, as well as

in the perinæal region, and produce serious apyrexial symptoms and intense pains. Genuine peritonitis occurs far more rarely.

When perforation into the interior of the bladder has occurred at the same time, the phlegmons are accompanied with so-called *urinary infiltration*, with considerable œdematous swelling of the perinæum, of the anal region, and of the scrotum. A detailed description of all these affections, which even in the most favourable cases end in slowly-healing fistulæ, cannot be considered here.

In some rare cases chronic cystitis is complicated by *pneumaturia*. With the last drop of urine air escapes with a distinct sound (*Pichler, Quiquerez*). The cause of this symptom, sometimes observed for years, is found in the abnormal communication of the bladder with the intestines; in one case it appeared to be connected with a typhoidal ulceration of the intestine, which, after having formed adhesions with the bladder, perforated into the latter viscus. Another form of pneumaturia exists, which is caused by intravesical fermentation of urine in persons suffering from diabetes, with production of carbonic acid (*Guiard*) or hydrogen (*W. Müller*). Finally, *Tisné* has recently observed spontaneous evolution of gas following purulent transformation of the urine.

For details on pyelitic complications of cystitis, see section on "Pyelitis." According to our personal observations, it is rare to meet with normal kidneys when death has occurred from urosepsis or ammoniæmia.

Necropsy sometimes unexpectedly reveals tuberculosis of the bladder, which of course explains why the most rational treatment has met with obstinate resistance.

Course and Prognosis.—The prognosis of simple acute cystitis is exceedingly favourable. It is usually cured in a week or two. Some cases occurring during pregnancy have been described as *sui generis* (*Cauvy, Terrillon*), to distinguish them from inflammation of the mucous membrane of the bladder, caused by compression of the gravid uterus by abnormal irritability of the viscera during pregnancy.

The prognosis becomes less hopeful the longer the disease lasts; that of chronic catarrh is doubtful. Finally, in cases where the cause cannot be removed (tuberculosis, cancer, myelitis, excessive hypertrophy of the prostate), the prognosis becomes gloomy. Rational treatment of stricture of the urethra or of vesical lithiasis exercises the most favourable influence on the course of the disease. Advanced age and a broken-down constitution greatly aggravate the prognosis. The greatest difficulty is experienced in keeping the inflammation within moderate bounds.

Diphtheritic and gangrenous forms are always serious, as are also complications with pyelonephritis. The danger is greatest in cases of cystitis accompanied by gravitating abscesses and

urinary infiltration. Finally, cases complicated with peritonitis usually end fatally.

More or less destructive ulceration is fairly frequently improved by rational treatment.

Regarding vesical gangrene in cases of retroflexion of the gravid uterus, *Krukenberg* remarks that catheterism before the sixth day never produces expulsion of the membrane, and that in beginning before the tenth day there is no fear of perforation.

DIAGNOSIS.—The condition of the urine, which in *spasm of the bladder* does not contain formed elements, prevents vesical catarrh being taken for a neurosis.

For differential diagnosis between pyelitis and urethritis, the reader must be referred to the sections on these subjects. Thanks sometimes to symptoms previously mentioned, rarely to the assistance given by a special analysis of the first drops of passed urine, one can say whether the catarrh is localized to the urethral orifice or to the fundus of the bladder (we distinguish inflammation of the posterior part of the urethra from vesical catarrh), or whether it extends over the whole of the interior of the viscus.

According to *Heitzmann*, an early diagnosis of pericystitis may be made by the presence of epithelium containing (2 to 6) pus corpuscles in the urinary sediment. This epithelium, with "endogenous pus formation," is said to originate from the middle layer of the mucous coat, and to be shed on account of continuous external pressure of the pericystic tumour.

In women the case is not one of difficulty (marked pus deposit), and we must distinctly warn our readers against forming a diagnosis of a purulent process in the urinary passages by mere observation under the microscope of leucocytes in urine *spontaneously* passed. The admixture of vulvo-vaginal secretions in the urine with numerous round cells is so usual that we, as a matter of principle, only make a diagnosis after examination of urine drawn off by catheter.

The diagnosis of croupous, gangrenous and diphtheritic cystitis can only be arrived at by the condition of the urine and by the presence of shreds, etc.

The diagnosis of interstitial cystitis may be very difficult, especially when the anterior wall only of the bladder is affected. External palpation of a tumour, corresponding in position with the bladder, palpation from the rectum, from the vagina, and the determination that this tumour formed suddenly and is exceedingly painful, are of great diagnostic importance. In cases of emergency, diagnosis may be aided by exploratory puncture with a fine trocar. But even in this case confusion with phlegmonous pericystitis cannot always be avoided. Finally, perforation nearly always supplies characteristic symptoms.

We must also distinguish vesical catarrh from *bacteruria*, men-

tioned by *Roberts* and others. Here freshly voided urine has a disagreeable pungent smell; the bacteria are numerous, but the urine has no tendency to ammoniacal fermentation either in the bladder or outside of the body, but, on the contrary, retains for a long time a very strong acid reaction. The number of round cells contained in the deposit is very insignificant. A duration reckoned by years, with constant remissions, characterizes this affection, which we ourselves have observed in various transitional stages towards the genuine catarrh, and which may be accompanied by moderate vesical irritation (strangury). Schizomycetes belong, it would appear, to the *Bacterium termo* group, and do not depend on the quality of urine.

When the course of cystitis is prolonged, and accompanied by serious derangements of the nutrition and febrile phenomena, tubercle bacilli must always be looked for.

As to endoscopic examination, to which one must always have recourse in these and all obscure cases deviating from the common type, we must refer the reader to the section "Tumours of the Bladder."

Treatment of Pyelitis and Cystitis. — The *prophylactic measures* and *causal indications* are naturally decided by the etiology. The use of cantharides and balsamic preparations must be carefully watched, and large doses must be avoided, especially when the symptoms are first noticed. We have devoted special sections to the treatment of the diseases which usually lead to pyelitis and cystitis, diseases against which rational treatment has great effect—we mean, nephrolithiasis, cystolithiasis, gonorrhœa, and urethral stricture.

Catheterism—and this is an essential point—must be practised with the greatest circumspection, and with every antiseptic precaution. Those who are content with simply passing the catheter through an antiseptic fluid after use must expect unpleasant experiences. Disinfection of the catheter is rendered difficult, in consequence of septic material collecting itself in the cul-de-sac between the eye and the end, and thus furnishing a suitable soil for cultivation of bacteria. *Hüpeden*, *Ward*, and *Cabot* wisely recommend instruments with a solid end. *Wolfner* has recently drawn attention to the catheter with simple central opening, the disinfection of which is easier, and which prevents the lesions proceeding from the fenestra of the new instrument. We should certainly give it the preference, did we not recognise the necessity in many cases of catheters with a smooth conical or oval end.

By making it a rule to clean the metal instruments each time they are used, disinfection is greatly facilitated. Of course, catheters should be kept in a suitable place. The surest way is to boil them. It ruins soft catheters to keep them long in a 5 per cent. solution of carbolic acid. We may consider a $2\frac{1}{2}$ per cent. solution, in which the instruments remain a quarter of an

hour, as harmless. We have given up the method of applying fat or oil to the instrument before use, or injecting such matter into the urethra itself (*Englisch*), and have employed, according to *Ultzmann's* recommendation, simply glycerine, which has the advantage of being soluble in water; it must be taken each time from a closed vessel. The best fat is a mixture of vaseline and lanolin. *Küster* advises that the vulva be carefully washed before catheterizing women, and to control the introduction of the instrument by inspection. This has been discussed in the section on "Etiology."

This is not the place to go into details of the technique of catheterism; manuals on surgery give the necessary information. At the same time we maintain that false passages, followed by fatal urinary infiltration, made by careless or inexperienced practitioners, and resulting from serious mistakes with regard to the fundamental rules of interference, are far from being rare.

The treatment of simple *acute* catarrh of the urinary organs, pyelitis and cystitis, should be as much as possible expectant and symptomatic. Rest, bland diet, cold or hot fomentations or poultices, according to the susceptibility and reaction of the patient, with regular action of the bowels, are the means by which most cases are cured.

Large quantities of fluid, as is usually recommended, and the use of various infusions and mineral waters, are not of much use in cases of tenesmus. On the other hand, the practice of withholding liquid, even alkaline waters, is, in our experience, not called for (*Pantoppidan*).* In cases of intense strangury, and where the aforementioned painful symptoms are present, narcotics must be employed (but not the favourite preparations of belladonna) either internally or subcutaneously, or, again, in the form of rectal or vaginal suppositories. Cocaine, on account of its ephemeral action, is of little value. Hip and lukewarm baths, and, if need be, leeches and cupping, may be prescribed. We have for years completely given up the use of balsams and astringents, which are still too frequently employed, and we do not think that our patients have been the losers.

We cannot make up our minds to prescribe camphor, lupulin and mercurial ointment, or preparation of iodine. In cases of intense hæmaturia, ergotin may be allowed. In such cases, *Horovitz* recommends plugging through the catheter. Acute retention of urine, not giving way to the remedies indicated, calls for *extremely cautious* drawing off of the urine by means of a soft

* Warm baths, hot fomentations or poultices over the hypogastrium, to which opium may be added, are often of use. In some cases removal of blood by leeches is advisable. The bowels should be kept freely opened, for which purpose enemata may be employed. Suppositories of opium or belladonna are valuable for relieving the local symptoms. Boiling water may be allowed freely, and well-diluted citrate of potash, with tincture of henbane or opium, should be given.—W. H. G.

catheter, and, when the pains are excessive, this may be done under an anæsthetic.

The treatment of *protracted* and *chronic* pyelitis may be purely medical, except in cases where renal complications call for a surgical operation. It is quite a different matter with inflammation of the bladder, which is accessible to *local treatment*. It has become a custom to immediately treat locally every case of cystitis which has a tendency to become chronic, especially by irrigation, although it has recently been pointed out that this may be contra-indicated. *Desnos* erroneously warns against irrigation altogether. We ourselves have for years advocated this method of treatment, but we never employ it until internal remedies have proved useless. This latter is, however, by no means always the case if marked bacterial infection and retention of urine, which always require local treatment, do not exist. Generally speaking, and especially from the theoretical point of view, it must be admitted that cases of pyelitis and chronic cystitis, with abundant suppuration and acid reaction of the urine, call for the use of agents *diminishing secretion* and ammoniacal fermentation, the use of such rendering the urine acid. Both conditions require the use of *antiseptics*, among which most of the astringents and acids must be included. We have already discussed the exhibition of these last while speaking of the treatment of nephrolithiasis. It is not our intention to enumerate the many anti-gonorrhœal remedies and disinfectants recommended in catarrh of the bladder. Prolonged use of strong poisons, such as lead and mercury, must naturally be avoided, but we do not deny the good effects obtained in some cases with large doses of acetate of lead, as again recently recommended by *Dalmer*. Certain remedies have always had a special reputation: lime-water, tannin, gallic acid, folia uvæ ursi; the action of the last-named is not so much due to the tannin and gallic acid as to the specific glucoside which it contains. This glucoside, termed *arbutin*, according to *Lewin*, who warmly advocates it, leads, amongst other substances, to the formation of hydrochinone in the organism. The formation of this substance at the seat of the disease must be looked upon as important, but *Paschkis* and *Feibes* have recently thrown doubt upon the point. Arbutin gives rise to no harmful secondary effects (*Menche*). Personally, we are not in the least enthusiastic about any of these astringents, including the expensive arbutin. Certainly results are obtained, but they are neither frequent nor brilliant.

We have obtained better, but equally uncertain, results with potassium chlorate, first prescribed by *Edlefsen*. It would appear that this drug does not act by favouring the epithelial regeneration in consequence of the liberation of free chloric acid, but by producing contraction of the vessels (*Boegehold*).

In a certain number of cases where this drug gave no result,

we have had recourse to *turpentine-oil*, so much recommended by *Bartels*, *Dittel*, *Cantani* and others, with an apparently successful and immediate result. The amount of pus was much reduced, and, in cases of decomposition of urine, reaction was restored. The odour of violets, given to the urine by the drug in question, is only an additional recommendation in its favour. With the exception of certain sensitive individuals, turpentine may be given daily for months in doses of 20 to 50 drops (taken in milk). We must, however, confess that more recent experience has not confirmed our first impression, and we have been obliged to reduce the dose and give it for shorter periods.

We have not had sufficient personal experience of other balsamic preparations to be able to pronounce an opinion on their effects (see "Treatment of Gonorrhœa").

We have already mentioned the services which internal use of *salicylic acid* may render, and which we were the first to recommend. Our own experiences and communications from competent authorities (*König*, *Neumann* and others) only serve to confirm the efficacy of this comparatively harmless antiseptic, and which may, in large doses (up to 10 grammes per diem), be successfully used against ammoniacal fermentation, in cases where there is no notable urinary stagnation. On the other hand, as we have often observed during the last ten years, the amount of pus secreted is not influenced. *Roberts* has also found in salicylic acid an excellent means of quickly and surely suppressing bacteruria.

More recently *Boegehold* has recommended salicylate of sodium instead of salicylic acid, and he regards it as a veritable specific in rheumatic and gonorrhœal cystitis. The prognosis of these pathological conditions, and the reasons which we will give, lead us to prefer the acid rather than the salicylate of sodium. According to our experience, salicylic acid has, like a certain number of other organic and antiseptic acids (benzoic, cinnamic, camphoric, anisylic, cumonic acid, etc.), the unfortunate property of becoming more soluble, and losing its antiseptic value, in the process of forming salicylates. Of the above-named acids, we have recently tried, by the mouth, *benzoic acid*, first recommended by *Gosselin* and *Robin*, and *cinnamic* and *camphoric acid*. None of these possessed the efficacy of salicylic acid, although their antiseptic properties, to some extent, surpass it when in the free state. The one possessing properties nearly equal to it is *camphoric* acid, which, like the two others, is not irritating, and may be administered without the least danger in smaller doses than salicylic acid (half) (1 gramme three to four times per diem). In about half the cases (about fifty) there was a decided effect. This acid, like salicylic acid, acts less on the purulent catarrh than on the decomposed urine.

As it is relatively dear, we only give it when, owing to idiosyncrasy, salicylic acid cannot be taken.

Some years ago *Rossbach* warmly recommended *naphthalin*, in doses up to 5 grammes per diem, stating that it quickly suppressed all the bacteria contained in the urine. We have frequently administered this drug in a chemically pure form, and we willingly admit that, in cases where ammoniacal fermentation of the urine was not very intense, it caused a considerable diminution of fermentative action, thanks to its metamorphosis into products such as naphthachinon (*Penzoldt*) or corresponding ether (*Cagnoli*). Nevertheless, we have been obliged to give it up for some time, as increase of strangury and exacerbation of other symptoms were too frequent not to be etiologically connected with the exhibition of the drug. Patients, who while using it complained of diarrhœa and intestinal irritation, felt relieved when they stopped taking it. We have observed inflammatory swelling in the region of the urethral orifice, exacerbation of painful symptoms, and even hæmaturia; *Pick* and *Rasmussen* insist especially on these points, and the latter declares he has never seen improvement with naphthalin. The recent attempts to deny the disturbances caused by this substance are to us incomprehensible; at any rate, the facts remain.

We have, finally, experimented with *cumol*, and introduced it into the treatment. It is an antiseptic which as such is just as efficient as naphthalin and has not the same drawbacks. It is a propyl-derivative similar to benzine, equally liquid and volatile, but somewhat dearer. It may be given in daily doses of 1 to 3 grammes as an emulsion. Unfortunately, it frequently happens that the drug cannot be continued, as it produces very unpleasant eructations and dyspepsia. In cases where it could be taken, cumol has done excellent service. Nevertheless, scarcely one-third of the sixty cases in which we have employed it have benefited by it. We cannot sufficiently emphasize the fact that copious production of pus and great decomposition of urine resist the exhibition by the mouth of all the remedies we have mentioned.

Opinions differ greatly as to the efficacy of *resorcin* and *salol*. Contrary to various authors, we have obtained no results with boric acid by the mouth. Poisonous carbolic acid and mercurial preparations are absolutely contra-indicated. We will not enumerate all the other remedies, most frequently recommended without experience. Of all the drugs mentioned, we again repeat that not one can be regarded as a specific, and, in view of the impossibility of establishing special indications for each of them, we are reduced to their empiric use.

In cases of chronic catarrh of the bladder, when internal treatment is inefficacious, or when it is not indicated as the sole remedy, it is advisable to employ *local treatment*, of course apart from slight painless conditions, where therapeutic intervention is best avoided.

For many years we have preferred the use of weak solutions, at the body temperature, of *salicylic*, *boric*, and *benzoic* acids (but not of their alkaline salts), according to the sensitiveness of the patient. We use 0·05 to 0·2 per cent. solutions of the first and last-named drugs. *Boric acid*, which we, as well as many authors, admit suits most patients (*Liebreich*, *Casper*, etc.), may be used in solutions of 1 to 3 per cent. In very pronounced cases of strangury, morphia may be added to the solution, or injected subcutaneously. As a result of our daily experience, we are convinced that the various other antiseptics, especially those already mentioned, may give similar results. We especially mention camphoric acid, with which *Niesel* is very satisfied, nitrate of silver (*Guyon*), alum, sugar of lead, chloride of zinc, permanganate of potash, perchloride of mercury, phenol, etc. But it is important not to employ these solutions in strength sufficient to produce irritation or intoxication. This warning is especially applicable to strong solutions of perchloride of mercury and carbolic acid, for the latter frequently acts with great rapidity (*Schüller*).

In putrid fermentation of urine, emulsion of naphthalin, cumol, creolin, iodoform, and even calomel, may prove very useful by their prolonged contact with the mucous lining of the bladder. Irrigation of creolin, which, even in the weakest concentration, frequently causes great pain, has a marked deodorizing effect. Our experience teaches us that finely-pulverized iodoform (at the most 1 gramme) is best added to the last portion of the liquid to be injected, and then left inside the bladder. In several cases of this kind (tabes), we have observed post-mortem at the end of four or five days a slight iodoform coating over the mucous membranes. *Chandelux* recommends for the same object, and as especially efficacious, ethereal solutions of iodoform, while *Mosetig-Moorhof* recently recommended an addition of glycerine and tragacanth.

When the products of secretion are specially ropy, solutions of chloride of sodium, of sulphate of magnesia, etc., are used with great advantage (Wiesbaden waters are recommended by various authorities).

The practical results of local treatment are not less variable than those of internal treatment, both as regards checking fermentation and suppuration, and especially painful strangury; the results of the former are sometimes astonishing when the latter has failed. In a second group of cases the results are not remarkable, and in a third, unfortunately rather a large one, practically nil, as there is scarcely any effect on ammoniacal or putrid fermentation. Enthusiastic recommendation of remedies supposed to cure every vesical catarrh, and to deodorize every kind of urine, must be discounted.

Syringing, indispensable in cases of stagnation of urine in order

to obtain evacuation, is, according to our opinion, best effected by the aid of an irrigator and a plain elastic catheter, which should only just be passed over the vesico-urethral orifice. We object to the metal double-current catheter, which may seriously injure the tissues, and which, by letting the liquid pass immediately, does not allow of the thorough removal of the secretion, as *Desnos* has proved by means of interesting experiments with artificial glass receptacles. Rubber tubing connects the irrigator with the catheter, a glass T-tube being inserted between them to carry off the returned fluid. In this way the bladder may be filled and emptied in a very simple manner, the patient either standing, sitting or lying down.

Such irrigation with 1 to 5 litres of the aforementioned solution, after a preliminary cleansing with warm water if necessary, may be used from three times a week to four times a day for months. For reasons already given, care must be taken not to distend the bladder too much, especially in old people, as careless irrigation has been known to lead to rupture of the bladder. On the other hand, it is sometimes necessary in concentric hypertrophy to fairly distend the viscus, but it must be done with the very greatest care (*Moreau-Wolf*, *Ultzmann*).

Marked atony of the bladder and considerable hæmorrhage contra-indicate higher temperature of the liquid injected. We have never found it necessary to have recourse to *Ultzmann's* procedure of exchanging the irrigator for a syringe, in order to stir up the urinary sediment. But when the secretion is viscous and very abundant, it is sometimes advisable to use a simple metal catheter, which may be moved in every direction inside the bladder. The double-current catheter cannot be used for this purpose.

When catheterism is very painful, a catheter must sometimes be tied in. We are not at all enthusiastic about irrigations without the catheter, which are so constantly again brought into notice. We have, in the course of many years' experience, come to the conclusion that slight and not very painful chronic catarrhs should be considered as a *noli me tangere*.

Küster recommends for women simple straight glass tubes, with an oblique vesical end with infundibuliform dilatation and well-adapted conic-shaped indiarubber insertion. *Struppi* is a warm partisan of injections made through *Simon's* urethral speculum.

Local treatment of *gonorrhœal cystitis*, in cases where the disturbances are not ephemeral and do not disappear spontaneously, deserves special mention. The danger of propagating the inflammatory process of the urethra to the regions adjoining its vesical opening has led practitioners to abstain from topical, instrumental, and irritating treatment, and to seek to combat the singularly localized inflammatory process by *cauterization with nitrate of silver*. *Guyon's* instillations, which have greatly con-

tributed to making his name celebrated, consist in emptying the bladder, and injecting by means of *Pravaz's* syringe, through a fine-channelled, bulb-ended bougie of indiarubber, twenty to thirty drops of a 0·5 to 5 per cent, solution of nitrate of silver into the hindermost part of the urethra.

The immediate reaction following this cauterization, and which naturally mostly affects the posterior portion of the urethra and the neighbourhood of its vesical opening ('neck of the bladder'), is exceedingly violent; intense strangury, painful swelling of the mucous membrane, with abundant secretion, and even hæmaturia, ensue. According to numerous experiments made by *Guyon* and his followers (*Leprévost, Guiard, Delefosse, Desnos, Dubuc, Weiss,* and others), there is no doubt that the final results of these instillations in many especially acute cases are most brilliant, when repeated several times a week. Not, however, in all cases, we must add, and, if our experience may be taken into consideration, not even in the majority. We must especially give warning against using concentration of 10 per cent. and more, and against frequent repetition of a process so very painful for sensitive patients. *Guyon* and his followers have gradually diminished the strength, especially in cases of gonorrhœal cystitis; patients suffering from urethritis can generally bear larger doses. It even seems to us that the most recent recommendations not to empty the bladder completely before the instillation, and to employ diluted medicated solutions, even for chronic forms, are made with the object of creating a wise transition between this procedure and the vesical irrigations mentioned above.

Guyon, who has already reduced his doses to 2 per cent., declares that, even in ammoniacal fermentation of the urine, nitrate of silver is more useful than the above-mentioned antiseptics, because it powerfully modifies the mucous membrane. This assertion seems to us to be at least as daring as that of some enthusiasts who look upon this method as a panacea for all kinds of cystitis.

All manipulations with nitrate of silver require attention and care with regard to the patient's linen.

Serious vesical catarrhs, absolutely refractory to treatment, accompanied by stagnation and ammoniacal fermentation of the urine and exaggerated urethro-vesical sensibility, to the extent of rendering the injections made with the softest catheter (in spite of the use of cocaine) intolerable, require, according to *Parker, special surgical treatment*, consisting in *opening* the bladder and replacing the catheter by the drainage-tube, the favourable action of which has already been observed in operations on the bladder (cystotomy).

More than forty years have elapsed since *Parker* proposed to relieve the inflamed bladder by rapid evacuation by means of an incision similar to that practised in lithotomy. Since then

operative treatment of cystitis has made but little progress. *Krysiewicz* recently observed in one year 100 cases. The reason is, we believe, to be found in the fact that the large inflamed mucous surface of the affected organ remains in its entirety inside the body. As *Horowitz* rightly emphasizes, the bladder may, under the said conditions, be, in fact, considered as an abscess with disadvantageous outlets. Thus, the operation gives free issue to the stagnated secretion, eases the muscles, and renders the mucous membrane accessible to medication.

Nevertheless, surgical interference, even putting aside the sectio alta proposed by *Guyon* in place of the 'button' opening, but feared because of its dangers, and only taken into consideration in very rare cases, furnishes, in spite of its apparent disadvantages, a very large mortality, which, however, cannot be exactly estimated in consequence of some of the cases being, *à priori*, hopeless through complication with renal affections. On the other hand, a considerable number of real cures and lasting relief (*Collot*, *G. Simon*, *Thompson*, *Dittel*, *Weir*, *Zielewicz*, and others) justify an operation suppressing the function of the bladder, considered as a self-distending and self-contracting urinary reservoir (*Krysiewicz*). *Fehleisen* has recently pleaded for suprapubic cystotomy with permanent drainage-tube, or with formation of a fistula, according to *Nussbaum*.

Gluck and *Zeller* go much farther. After having convinced themselves of the practicability of the operation through experiments on the corpse and on dogs, they, as well as *Vincent* and *Passerini*, have ventured to propose *extirpation of the bladder and of the prostate* for incurable cases, which finally would lead to certain death from pyelonephritis. As far as we know, nobody has as yet ventured to perform this radical—and, indeed, rational—operation, except in cases of ectopia (*Langenbuch*). On the other hand, *partial resection* for the treatment of difficult defects has in some cases been practised with success (*Schatz*). Nevertheless, nothing very satisfactory is known regarding this procedure.

Znamensky's recent experiments on dogs are of theoretical interest. He was able to resect as much as two thirds of the vesical wall of a dog without fatal result, but not without causing the deposit of abundant concretions, due to the strong tension of the walls of the organ and to the free access of urine to the ligatures.

In women, drainage, which is also indicated in serious bacterial forms (*Fritsch*, *Jackson*, and others), may be applied after *forced dilatation* of the urethra (*Simon*). It is obvious that in exfoliative cystitis this dilatation becomes necessary for the removal of the membranes.

The treatment of prevesical phlegmons as well as *interstitial* and *pericystic* abscesses in general is essentially surgical. One

must not wait till fluctuations appear above the symphysis or in the perinæal region, and prove the presence of purulent foci, but make an incision as soon as the existence and the seat of the abscess have been determined by some means or other (especially by puncture with a fine trocar).

Complicating diffuse urinary infiltration usually defies all treatment.

For details on the important task of plastic surgery in cases of gangrene of the bladder walls (vesical lesions in general), with formation of fistulæ, etc., surgical and gynæcological manuals must be referred to.

In certain cases of chronic cystitis, rational *diet* is of considerable importance. On the other hand, however, the importance has been exaggerated, and patients, already suffering intensely, are unnecessarily further tormented. With the exception of the necessary diet for lithiasis, we confine ourselves to the following advice: Moderation in eating and drinking, little alcohol, no mustard, pepper, or horse-radish; but we do not entirely exclude salts and acids. We prescribe as much as possible milk and leguminous vegetables; but, when accustomed to it, we allow the patient a moderate quantity of good beer or red wine.*

The bladder sometimes has a particular idiosyncrasy against some kinds of liquids. Tyrolese wine sometimes produces, even in healthy persons, slight irritation of the mucous membrane of the bladder, abortive, fleeting forms of cystitis which, we are sure, have no connection with the mechanical action of crystals of oxalate of lime. Experience is of more importance in such cases than theory. The simultaneous use of lime-waters or the waters of Wildungen or Carlsbad is often of great advantage.†

Marked debility naturally requires a strengthening diet. *Finger* is perfectly right in declaring that in these cases the first indication is to strengthen the system. Regularity of the bowels and proper clothing (woollen, and merino underclothes, etc.) are of the greatest importance.‡

In certain cases, internal as well as local treatment remains without effect, while change of climate, sojourn at the seaside or in the mountains, comfortable travelling, balneological treatment, produce astonishing results. The watering-places most to be recommended are much the same as those enumerated in the section on nephrolithiasis.§ The special superiority of Wildungen remains to be proved. Nevertheless, we cannot totally deny it:

* Both *Hartenstein's* and *Liebe's* leguminous preparations are to be recommended.—W. H. G.

† Baden-Baden, Battaglia, Bourbonne les Bains, Schwäbisch Hall.—W. H. G.

‡ We can most strongly recommend *Lahmann's* underclothing, a texture half wool, half cotton, and manufactured in various degrees of thickness appropriate for the seasons; for the summer a light network, for the winter a closely-woven material.—W. H. G.

§ Bournemouth, Mentone, Pau, Torquay, Ventnor.—W. H. G.

some cases seem to be specially adapted for it. Acratothermæ and hydropathic establishments are rightly recommended. The indications must naturally be carefully studied. Finally, country life or sojourn in Southern watering-place during the winter sometimes produces a favourable modification, even in the most desperate cases. In simple chronic cases of moderate intensity, when local treatment was dispensable, we have very often observed lasting improvement, if not complete cure, by sending the patients into a warm climate, where they escaped from the clutches of meddlesome specialists.

CYSTOLITHIASIS (URINALIS), CALCULI VESICALES.

Although the pathology and treatment of vesical calculus belong incontestably and nearly exclusively to surgery, we think it useful to mention it—at any rate, from a diagnostic point of view—for physicians are very frequently consulted by persons suffering from the same.

ETIOLOGY AND PATHOGENESIS.—The etiology and pathogenesis of vesical calculus resemble in all essential points those of nephrolithiasis. This resemblance is chiefly based on the fact that the majority of vesical concretions have been originally renal calculi, and that one seldom meets with calculi primarily developed in the bladder, or formed round foreign bodies, such as calculi of the prostatic gland, hairs from dermoid cysts, foreign bodies introduced into the bladder, projectiles penetrating into the bladder, swallowed mouthpieces of pipes which have entered the bladder by perforating the intestines. Out of the material collected from the Pesth Children's Hospital for thirty-eight years, *Bókai* did not find one case where vesical calculus was produced by a foreign body.

In speaking of nephrolithiasis, we have already insisted on the importance of *secondary* lithiasis (*Ultzmann*) as far as vesical concretions formed out of the deposits from alkaline urine are concerned.

We have also insisted upon the greater prevalence of calculi in the male sex. *Wedenski* only found 2 per cent. of women with calculi, in the examination of statistics covering thousands of cases (*Bassow*, *Klein*, *Thompson*, and others).

PATHOLOGICAL ANATOMY.—In most cases *one* calculus only is present. The weight may sometimes attain to half a kilogramme and more. Every year medical literature records observations of monster calculi. The usual forms are spherical, oviform, and discoid. When several concretions exist at the same time in the bladder (in certain exceptional cases hundreds have been found), they are faceted.

It is not uncommon to see concretions with protuberances,

apophyses which penetrate the mucous membrane, and prolongations into the urethral opening. The fact that calculi with a smooth surface are rare can be explained by the prevalence of coarse granular and rough triple phosphate.

The majority of mobile calculi occupy the middle part of the base. At other times they lodge in vesical diverticulæ. Some may even be firmly attached to the bladder by muscular trabeculæ.

The mucous membrane of the bladder when affected by catarrh (cystitis calculosa) is frequently the seat of erosions and ulcerations.

Ammoniacal fermentation of urine is usual. For details regarding incrustation and calcareous deposits on the surface of the mucous membrane, see the foregoing section.

Symptoms and Diagnosis.—The bladder may contain a small or large calculus without the patient experiencing the least discomfort. Nevertheless, this latent course of the affection is exceptional. This fact has been explained, more or less correctly, by anæsthesia of the mucous membrane, or by prevention of contact of concretions with the neighbourhood of the vesico-urethral orifice (adhesions, diverticulum).

Pains, disturbances of micturition, and the abnormal condition of urine, phenomena due to the presence of calculus, make way for a series of symptoms called *rational signs*, which vary according to size, shape, condition of surface, seat, mobility of the concretion, and according to the character of the accompanying catarrh. Generally these rational signs have only a presumptive value; they cannot of themselves make the diagnosis positive.

The *pains*, localized in the region of the neck of the bladder, at the base of the bladder, along the urethra, in the glans penis, appear after bodily exertion, after standing, straining, walking, but especially after sudden jolting. They sometimes appear suddenly and with unexpected violence ; but after resting, especially in the dorsal position, they diminish or disappear entirely. The extremely frequent localization of the pains in the anterior part of the urethra causes children to handle the penis, and this may lead to hypertrophy of the prepuce. The importance of this manipulation has certainly been exaggerated in the etiology of masturbation. But *Droixhé* rightly insists on the frequency of herniæ and rectal prolapse in children as symptoms of cystolithiasis resulting from violent straining.

The pains may become exceedingly acute as soon as the contents of the bladder are evacuated, and it is a pathognomonic fact for vesical calculus that the greatest intensity of pain corresponds precisely to the passing of the last drops of urine. We heard one of our patients, an old man, moan pitiably as soon as he had emptied the greater part of the contents of the bladder, whereas he otherwise did not complain.

Spasmodic reflex pains which radiate towards the rectum, the

vagina, the testicles, the lumbar region, and even the thigh, are frequently observed.

Among the *disturbances of micturition*, we consider interruptions of the flow of urine and more or less entire retention of urine as most important. Their pathogenesis is clear, and it is obvious why in certain cases simple, or even complicated, hydronephrosis is developed, in consequence of obstruction of the vesico-urethral opening through large concretions. Almost always, but especially when intense cystitis exists, the patient feels the desire to micturate very frequently, a desire he can only satisfy by placing himself in the most extraordinary positions. Strangury often continues after the bladder is empty, and it is frequently accompanied by a certain degree of incontinence.

The *urine* itself, corresponding to the condition of the mucous membrane, is usually of a cystitic character. It is very often hæmorrhagic, and in a state of ammoniacal decomposition. The salts which it deposits generally indicate the actual constitution of the surface of the calculi.

In a certain number of cases vesical hæmorrhage predominates. We have frequently seen vesical hæmorrhages after rather violent exercise, especially walking, become an essential element. These are the cases to which the name of "vesical hæmorrhoids" is given. We do not, however, deny that varicosity of the much-abused vesical veins may be the origin of hæmorrhages. Sometimes the calculous origin of the hæmaturia is masked by the hæmorrhagic diathesis (*Lejars*).

In certain cases the aforementioned phenomena to some extent appear periodically, principally caused by the alternate exacerbation and remission of the catarrh and the concomitant urinary fermentation (*Neubauer*, *Bókai*).

Lithiasic cachexia appears in the course of years. For details of its origin we refer to what we have already said when discussing cysto-pyelonephritis.

The rational signs when combined are important, but by no means conclusive. What finally decides the diagnosis is the positive result of vesical exploration with the sound or a similar instrument. In contact with the concretion, the sound furnishes signs perceptible to touch and hearing. We shall not now enter into details as to the manner of determining the size, the position, the mobility of the calculus, or the difficulties of diagnosis, especially [illegible] the concretions have settled in folds of the mucous mem[illegible]us giving rise to various sources of error: contact wit[illegible] of tissue covered by the incrustations, contact with ex[illegible] growths, etc. The fact that vesical calculus is s[illegible] discovered after the patient has consulted a number [illegible]ists proves that the diagnosis of the disease [illegible]es even for the most experienced.

[illegible]ce of vesical concretions can be made out.

by the vagina, the rectum, and even the abdominal walls; thus, we cannot too strongly recommend bimanual examination. By means of rectal palpation *Volkmann* succeeded, especially in young and thin individuals, in demonstrating the foreign body by seizing it and bringing it on to the os pubis.

In some cases the calculi found in the bladder were nothing more or less than intruding *gall-stones* (*Güterbock* and others).

When, in spite of the most minute appreciation of all the symptoms and the use of various means of investigation, diagnosis remains uncertain, recourse must be had to two comparatively recent methods of exploration: *endoscopy* and *Thompson's* digital exploration of the interior of the bladder through an incision in the manner of the buttonhole into the urethra from the perinæum.

For the details of cystoscopy, recently improved upon by *Nitze*, and which a few years ago experienced surgeons refused to believe in, see the section on "Cancer of the Bladder."

The direct exploration of the bladder through the perinæal wound from a diagnostic point of view, also methodically practised before *Thompson's* time by *Volkmann* in 1873, constitutes the first step of an intravesical operation. *Thompson* regards this method as destined to aid diagnosis in serious vesical affections in general, and to allow of the extraction of calculi and tumours, and as a sure and safe operation. In 1884 he was able to bring forward forty-three cases. He has, nevertheless, opponents, and experienced surgeons, after having performed urethrotomy, were never able, in spite of all possible assistance, to explore the bladder *in toto*, especially in adipose patients (*Dittel*). Before employing such radical measures it is preferable to first try cystoscopy.

Prognosis and Treatment.—As a general rule, the volume of the calculus increases in the course of time, and as a sequel naturally leads to increase of the disturbances and objective dangers (cystitis, pyelitis, renal suppuration, etc.). As a general rule, persons become cachectic from pain and insomnia more than from loss of blood and from suppuration. Spontaneous cures following expulsion of small concretions from crumbling fragments of stratified calculi are rare.

Litholysis plays in cystolithiasis quite a subordinate part when compared with the importance of *operative* removal of the calculi. This operative treatment either consists in removing the calculus through the urethra with or without preliminary crushing (lithotripsy, lithotrity, litholapsy), or by means of lithotomy—*i.e.*, incision into the urethra or the bladder. *Perinæal lithotomy* and *lithotripsy* have been combined, and the bladder has been opened from the rectum.

All these operations, with their special indication, belong to surgery. While referring our readers to special works on the

subject, we must content ourselves with adding that the successive improvements made in operative technique singularly limit the number of contra-indications of lithotrity, formerly regarded as a most dangerous proceeding, and show that the frequency of relapses after this operation has been exaggerated (*Schönborn*). For small or moderate-sized free calculi with a normal urethra and prostatic gland, and moderate quantity of urine, and when the irritability of the bladder is not too great, *Antal* only allows litholapaxy, which *Pousson* also considers to be the proper operation.

For cystotomy two methods may be used: *high cystotomy* ("epicystotomy") and *perinæal cystotomy* (median, lateral, prerectal). The latter, most frequently practised and the least dangerous, is, according to *König*, the normal method for small concretions and movable foreign bodies. In bad cases high cystotomy is to be recommended. Recently English surgeons of great experience have not been able to agree as to which operation should be performed in any given case. *Smits* is strongly in favour of the high operation. He entirely rejects—like most surgeons—lateral lithotomy, and only in exceptional cases does he agree to median lithotomy. In women, simple dilatation of the urethra may supply the same results as median cystotomy in men.

The treatment of cystitis complicated with lithiasis is the same as that of catarrh in general.

TUBERCULOSIS OF THE BLADDER.

Cystophthisis.

For the *etiology* and *anatomy* of this disease see p. 68.

Tuberculosis of the bladder, especially common in men, generally presents itself as a *partial symptom* complicated with extensive primary tuberculosis of the uro-genital apparatus (kidney, ureter, prostatic gland, vesiculæ seminales, testes), less frequently after pulmonary phthisis or as a purely local process. The affection may develop in consequence of simple chronic cystitis, sometimes after gonorrhœa or orchitis. In such cases tubercle bacilli and gonococci are found in the urethral secretion (*Babès* and *Cornil*).

The question whether, in these cases, the condition is one of primary tuberculous infection, or of tuberculous infection brought about by a gonorrhœal lesion, the predisposition remaining latent, still remains unanswered. Sometimes injury is the causal factor.

The extension of the tuberculous process is very variable and irregular. Sometimes it is found as deposits in the renal pelvis and the base of the bladder, sometimes it appears to extend continuously from kidney to urethra. Ascending tuberculosis is the most common. *Clado*, who admits that tubercles develop in the subepithelial layer of the mucous membrane, and not of the

submucosa, declares that extension of the process by the circulation is more frequent than that by continuity starting from the kidney.

In the bladder, tubercles are generally found in the region of the urethral orifice and of the trigone. In all cases fresh caseous tubercles, with sharp-edged and sinuous ulcerations which undermine and destroy large portions of mucous membrane, are frequently met with. We have often observed a type strikingly resembling dysentery of the colon. Sometimes the whole internal surface of the organ suppurates and is covered with ulcerations. Deep ulcerations are rare. Fungoid proliferations—which, as *Englisch* rightly observes, are almost always characteristic attendant symptoms—are often found.

The parts of the mucous membrane which are not the seat of tubercles are attacked by catarrh. The urine presents ammoniacal fermentation and other phenomena of decomposition.

Symptoms.—With the exception of the morbid phenomena attributable to possible tuberculosis of the lungs, of the intestines, and other parts of the genito-urinary apparatus, the symptoms of the affection essentially correspond to that of chronic ulcerating cystitis. Temporary hæmaturia, frequent strangury, and sometimes signs of vesical hypertrophy, are consequently observed. Corresponding to the extension of the ulcerations of the mucous membrane, the urine, besides products of the catarrh, presents very abundant débris, sometimes elastic fibres, shreds of mucous membrane, and caseous débris.

Diagnosis.—The diagnosis is based on the existence of tuberculosis in another organ (testicle, external orifice of the urethra in women), on hereditary predisposition, and, above all, on the presence of tubercle bacilli in the urine. Except at the very beginning of the disease, they are nearly always to be met with in the urine of such patients, together with the symptoms of cystitis. It is sometimes very difficult to judge whether renal tuberculosis exists at the same time or not. In a case of renal tuberculosis accompanied by bladder symptoms, and which was successfully operated, *Küster* was able, by digital exploration, to exclude cystophthisis. It is evident that cystoscopy may be of very great and direct assistance as to the nature of the affection.

Prognosis.—In spite of certain optimistic affirmations, we must candidly own that the prognosis appears to us bad. At the same time, we have known of cases in which the affection, accompanied by tuberculosis of the genital system, has been bearable for several years. According to *Routin*, the affection may last from ten to fifteen years.

Treatment.—Excepting general treatment, the local treatment is the same as that for chronic cystitis. We, as well as *Picard*, have seen but small results from the use of the over-praised

"specific" remedy, iodoform. *Routin*, *Dubuc* and *Englisch* wisely warn against irritating douching and the introduction of instruments. These procedures usually lead to serious necrosis and an exacerbation of the symptoms. In many cases narcotics are necessary. If the kidneys are simultaneously affected, one must be very careful as to the use of antiseptics (*Braatz*). Naturally, as might have been expected, cystotomy with sharp-spooning and cauterization of the mucous membrane has often been suggested (*Clado*). *Guyon* declares that he has cured a case of tuberculous cystitis by drainage and the application of iodoform-oil to the affected parts, in the course of seventeen days. If one was to publish, as *Wright* has suggested, a list of cases operated on successfully, statistics would certainly be far from favourable.

CANCER OF THE BLADDER.

ETIOLOGY AND PATHOGENESIS.—The most feared of all vesical new growths—carcinoma—is only found in about 1 per cent. of all necropsies (*Heilborn*, *Hasenclever*), and in about 0·4 per cent. of all tumours (*Gurlt*). Its frequency predominates in the male sex of advanced age.

It is generally *secondary*, and either appears as a symptom of carcinosis or as a result of extension from surrounding organs, from the rectum, the prostatic glands, and, above all, from the genital organs of women, principally from the uterus.

Primary cancer of the bladder is relatively rare. The tumours of the prostatic gland may easily be mistaken for vesical cancer (*Marchand*). Nevertheless, the existence of genuine primary forms cannot be doubted, and recent researches have brought to light a comparatively large percentage. Thus, *Küster* found in 11 cases of new growths of the bladder 3 primary cancers (out of a total of 8,233 surgical patients). *Wittelshöfer* saw 7 primary cancers of the bladder in 5,132 necropsies. In 1884 *Bode* had collected 25 (3 in his own practice), and *Sperling* 120, observations, including 49 cases of carcinoma and 42 of villous fibroma. We ourselves have observed primary cancer of the bladder three times, and the secondary form twice as frequently.

The etiology of the affection is as obscure as that of cancer of the kidney. It is worthy of notice that the disease sometimes proves to be cancer, after existing for perhaps ten years as a cystitis, with intermittent or remittent hæmaturia of vesical origin. *Rösen* has three times observed the coincidence of cancer of the bladder with cystolithiasis. The pathogenetic influence of the latter is as difficult to deny as hereditary influence. Neither one nor the other is proved.

PATHOLOGICAL ANATOMY.—Cancroid, developed in the submucous tissues, is the most frequent. Scirrhus and colloid cancer

are rare. *Küster*, *Whitehead* and *Pollard* consider these neoplasmata with adenoma and dermoid tumours as forms of epithelial origin, and oppose them to the group of papillary fibroma and sarcoma. For details on the structure and histology of these tumours, as well as of mixed and anomalous forms, *vide* manuals on pathological anatomy. We must mention that the condition known as "villous cancer," characterized by fine villous tufts, has only partly the character of carcinoma, and that in the majority of cases it belongs to the group of sarcoma, papilloma, etc. All these vesical tumours may present villous appearances. It is now recognised that abuse has been made of the unfortunate definition of villiform cancer, but, on the other hand, one cannot deny the possibility of transformation of benign papillomata into malignant tumours.

Cancer of the bladder usually originates about the region of the vesico-urethral orifice and of the fundus. Thence it spreads backwards and upwards, and sometimes forms a sessile or pediculated and even multiple, tumour, filling the whole cavity, or only infiltrating the walls of the organ in a diffuse manner, converting them into a hard mass. Nearly all forms have a tendency to ulceration and destruction of the tissues. Secondary communications with the rectum, the vagina, the uterus, and even the abdominal cavity, may result from these deep ulcerations.

Other parts of the mucous membrane are usually attacked by catarrh. Accompanying cystolithiasis is not very uncommon.

Symptoms.—In the majority of cases, the early stages are obscure and insidious. The chief symptom, and often the earliest one, is hæmaturia. Little by little, and after a certain time, according to the localization of the tumour, symptoms develop which often essentially resemble the 'rational signs' of calculus of the bladder. Nevertheless, the painful sensations caused by all bodily exercise are less pronounced in cancer than in cystolithiasis.

When the tumours are vascular, the tendency to hæmorrhage is very decided; micturition may always give rise to bloody urine, as we saw in one case for months. As no pain exists, this latter symptom is generally first noticed by the astonished patient by accident. Although it cannot be denied that there is a relationship between hæmorrhages on the one hand, and physical over-exertion, violent contraction of the bladder, instrumental exploration of the organ, on the other, yet cases are observed in which the urine may be decidedly hæmorrhagic during absolute
t, and not contain one drop of blood after all kinds of exertion.
he relative duration of the periods of hæmaturia and the
rvals during which the urine contains no blood is very
ible, and it is just the irregularity of blood in the urine and
ength of its duration that is characteristic (*Marcano*).
ood-clot, or portions of the tumour spontaneously detached,

... a temporary retention of urine, while obstruction ... urethral orifice through the steadily growing tumour ... retention of urine, to excentric hypertrophy of the ... finally to uræmia.

... ce, hydronephrosis has been seen to develop through ... of the orifice of the urethra by proliferation of the ... fibram recently observed obstruction of the urethra ... detached particle of tumour, which also obstructed the ... ne of the ureters. Serious retention of urine resulted, ... hrosis, compression of the vena cava, and ascites.

... sometimes appears only as a late symptom, but in ... ases it may occur at the end of some weeks, especially ... ent pains are continuous, which deprive the patient of ... when frequent hæmaturia is present. The pains are ... about by concomitant cystitis and the localization of ... ur at the 'neck of the bladder.' If uræmia, uro-sepsis, ... hæmorrhage, or peritonitis from perforation, do not rapidly ... the patient, a general unfavourable condition, often ... ated with serious dyspepsia, develops sooner or later. ... ame time the local disturbances, always increasing in ... become quite intolerable. Very few cases exist where ... ion is relatively bearable, or even painless.

... ine shows the same qualities as in cystitis, and, as ... remarked, has at times a decided hæmorrhagic character. ... ver, only exceptionally contains shreds of the tumour ... agnosis"). Later on, in consequence of ammoniacal ... on, and of decomposition of the tumour, a thick, dis- ... and exceedingly fœtid mass is evacuated, the odour of ... unbearable to the patients and their surroundings. In ... s, pyelonephritis is rarely absent.

... erforation of the aforementioned kind occurs, one ... observes fresh morbid symptoms. Concomitant pyelitis ... is are often found. *Rösen* observed incessant diarrhœa ... cation into the small intestines.

... ful affection, from the appearance of the first symptoms, ... the majority of cases about a year. It is more than ... hat in some exceptional instances the vesical affec- ... having lasted some years, finally appears as a can- ... the malignant neoplasm having, so to say, ... benign tumours (fibroma, papilloma). A ... this kind has been recently published by ... *Budor* declares that he has observed a ... ars' duration.

... diagnosis is difficult without the aid of the ... w); later on it becomes easier. Rectal or ... especially bimanual palpation, practised by ... lled combined rectal examination (dorsal ... bar region raised, under chloroform, with

full or empty bladder), often supplies valuable indications. *Exploration* of the bladder with a catheter, without mentioning the possibility of bringing away portions of the tumour, proves very useful. Thus, *Fürstenheim* and *Posner* have been able, in cases of primary epithelioma of the bladder, to determine the localization of the tumour in the lower part of the organ. Nevertheless, as we have ourselves seen, enlarged prostate or hypertrophy of the walls of the bladder may easily be misleading, and, on the other hand, a large soft tumour may escape diagnosis when the catheter is employed. In a case observed by *Musser*, the great hypertrophied prostate completely concealed a tumour situated behind it.

The sound, however, supplies the expert physician with more information than is generally supposed, and, in spite of recent observations, we are of opinion that skilful and delicate use of this instrument is in certain cases a painless and safe method of diagnosis. But it must be remembered that, practised by an unpractised hand, the sound may give rise to very unfortunate accidents.

With regard to the differential diagnosis of vesical and renal hæmorrhage, we must refer the reader to what we have already said on this subject. In some cases a distinction between the two conditions is impossible.

Continued aggravation of the general condition, in spite of intermittent improvement, and the onset of genuine cachexia, assist in arriving at a correct diagnosis and the exclusion of cystitis and cystolithiasis. When cancer of the bladder is almost entirely limited to this organ, and the iliac lymphatic glands almost unaffected, it is unfavourable for diagnosis, but favourable for surgical interference.

Diagnosis is certain when cancerous elements, under the form of intact or necrotic villi, or shreds, are found in the urine. The epithelial covering of these vascular reddish villi may be found normal in some cases; in others it is detached, and is found sometimes as such under the microscope. This makes the diagnosis of villous tissue very difficult, especially when it is necessary to determine its carcinomatous character.

Sometimes the tissues contain a larger quantity of hæmatoidin crystals, and of peculiar rosette-shaped formations, probably composed of oxalate of lime (*Ultzmann*). The latter are apparently closely associated with necrosis. But no physician would dare to base his diagnosis on them alone.

Other shreds of the tumour, which usually come under notice in the form of fairly extensive portions of membrane, are usually taken by the tyro for products of so-called vesical diphtheria. These shreds are very difficult to identify from the histological point of view, because of the necrosis with which they are attacked.

These shreds are all the more frequently found the more thoroughly and methodically the urinary deposits are examined. This is best done on a coloured plate and under water. Nevertheless, these shreds are in many cases absent during the whole course of the affection. We have recently observed two cases having from a clinical point of view almost identical symptoms; in the first the urine contained nearly every day portions of tumour, in the second nothing remarkable was to be found, although necropsy revealed a cancerous ulceration extending over the whole base of the bladder.

It cannot be too much insisted upon that cancerous elements may be taken for polymorphous or caudate epithelium cells. Carcinoma of the bladder reproduces in certain cases in a typical manner vesical epithelium, but even when these forms are found in abundance, one must not be too hasty in the interpretation of the facts. Thus, in a personal observation, where, in consequence of cachexia and the presence in the urine of "characteristic" cellular agglomerations, we concluded that carcinoma existed, the necropsy showed only a simple cysto-pyelonephritis. As *Marcano* rightly remarked, isolated cells are "always fallacious."

Particles of tumour often remain attached to the eye of the catheter. Nevertheless, to avoid profuse hæmorrhage, catheterism must only be employed for diagnostic purposes, and with the greatest caution, especially if *Küster's* "scoop catheter" is used, which has a sharp-edged eye on the convexity, intended for the removal of particles of tumour. There is great diversity of opinion as to its value.

Diagnosis is more readily made in women than in men. In women vaginal palpation and *dilatation of the urethra* (through which at times small pediculated carcinomata appear) are facilitated without an operation being necessary. Exploration of the internal surface of the bladder is of assistance in making a positive diagnosis. At the same time, forced dilatation of the urethra with the finger must not be resorted to if it can be possibly avoided, as it may lead to profuse hæmorrhages.

In men, and as a last resource, perinæal incision of the urethra followed by digital exploration may be resorted to. In this way the inventor of the method has been able, in twenty cases out of fifty-three, to diagnose a tumour in the bladder. The high operation may also be employed (*Guyon*). When the tumour exists, both these methods of diagnosis constitute a first step in the operation.

No method for the diagnosis of organic disease has led to more controversy than these two, especially at the hands of their chief advocates. *Thompson's* and *Guyon's* contributions to the subject alone form a section of medical literature. Although a certain agreement exists with regard to *treatment*, the decided manner in which

French surgeons have spoken against *Thompson's* method has a solid basis. *Guyon* declares that for aged persons with enlarged prostate and fleshy perinæum—and this is usual in such cases — the English method is defective even from a diagnostic point of view; whereas, on the other hand, *Guyon* points to the high operation as an absolutely safe method which opens the direct way for the finger. Furthermore, if one is able to illuminate the interior of the bladder, this method also allows of ocular inspection (*Trendelenburg*). Be this as it may, and taking into consideration the consecutive curative operation, the French method, which is the more simple, has the greatest number of partisans.

Although one has recently had recourse to one or other methods, neither of these operations may be considered as harmless. Before deciding upon such interference, it must be remembered that there is a risk of shortening the life of the patient, and that the expectation of finding a localization permitting of operation may sometimes not be realized.

For this reason we have welcomed the more recent method of diagnosis, which is without danger, viz., *cystoscopy*. We do not mean *Desormeaux's* old endoscope with a simple reflector, but the modern cystoscope of *Nitze*, who after much labour and endless experiments has simplified and perfected the old method.

The examination is made by the aid of an instrument introduced into the bladder, and provided at the vesical extremity with a small *Edison's* lamp worked by an electric battery of six elements (Fig. 6). By means of special optical contrivances the field of observation is considerably increased.

With the aid of *Nitze's* apparatus, a magnified portion of the vesical mucous membrane of the size of a crown piece,

FIG. 6.—CYSTOSCOPE.

and every detail, can be clearly seen, as also the vesico-urethral orifice and the openings of the ureters. According to the observations of *Nitze* and other authors (*von Bergmann, Dittel, Schuster, Nicoladoni, Küster, Goldschmidt* and others), the cystoscope allows of the discovery of calculi, fragments of stone, all kinds of foreign bodies (even silk threads), which usually escape the exploration made with the catheter.

But the real triumph of the cystoscope is in the case of tumours, and where an early diagnosis is necessary, viz., at the moment when the adjacent organs and the kidneys are not yet seriously affected, and when, in consequence, a surgical operation has a good chance of success. Even when palpation has supplied positive results, digital exploration, according to *Thompson's* method, does not guarantee against confusing blood-clots and soft tumours (*Riedel*). *Nitze's* cystoscope, which does not necessitate a lithotomy operation and presents no dangers, is equal, and even superior, to the two methods previously mentioned, its results being safer and having no disadvantages for the patient. Thus, it should be used, not late in the disease, but at the onset. Unfortunately, the use of this method is limited. Not only is permeability of the urethra necessary, but also a certain vesical capacity (nearly 150 cm.), and transparency of the contents of the bladder—at least, during examination. This last condition may be fulfilled in the majority of cases by repeatedly washing out the bladder.

The question how far the cystoscope, which is of such value in diagnosis, may be utilized therapeutically remains as yet unanswered. *Nitze* himself, as well as *Antal* and *Fenwick*, believe that it can only be applied in the case of small polypi projecting into the vesical cavity. For cancer of the bladder the cystoscope is exclusively of diagnostic value, absolutely indispensable, we believe, in a certain number of cases.

We, like *Fenwick*, have strong doubts as to this method becoming general amongst physicians, for the operative technique which this process demands, as well as the interpretation of what one sees with the cystoscope, is very difficult, and requires more experience than, for example, laryngoscopy. Like the latter, the cystoscope will only be used for a long time to come by specialists, one reason being the few cases where the use of the cystoscope is necessary. *Nitze* hardly mentions the violent pains of which the patients complain during exploration, in spite of the use of cocaine. This fact has been observed by us and by other authors, and we must insist on it. Sometimes even exploration practised by experienced and skilful surgeons has been followed by decided cystitis, which may produce very unpleasant complications. The bladder is not always "open to flattery." Nevertheless, there is no inherent danger in the method (*Goldschmidt*), and the accidents are mostly to be attributed to the difficulty of execution. Even

when practised by surgeons, rectal palpation itself may prove dangerous.

Finally, we must remark that in certain cases the cystoscope has proved as powerless as other methods of exploration, with the exception of *Guyon's* high operation method, to discover the tumour, and that in other cases, in spite of the cystoscope, simple ulcerations of the mucous membrane have been taken for carcinoma. All this must not prevent us from recognising the great advantages of *Nitze's* method. We cannot share the opinion that the cystoscope is indispensable, an opinion frequently expressed, especially by French authorities.

For *prognosis* and *treatment*, see below.

Sarcoma.

From the remaining tumours of the bladder *sarcoma* cannot, in spite of its at times benign evolution, be clinically separated from carcinoma. The angiomatous forms of sarcoma lead sometimes to extensive hyaline and amyloid degeneration (*Raineri*). We can only casually mention here the excessively rare non-papillary *fibroma, myoma, cystic tumours* (which *Cahen* has recently observed in the form of multiple cystadenomata), *dermoid cysts, hydatid cysts*, etc.

Amongst the benign tumours of the bladder, the most frequent and the most interesting from a practical point of view is the papilloma.

Papilloma.

These tumours exist in very numerous forms (*Virchow's* "papillomatous fibroma," *Küster's* "villous papilloma"). Apart from solitary pediculated or sessile growths of the size of an apple, and small multiple tumours so closely pressed together that they completely hide the walls of the bladder with a fluffy covering, a number of mixed and intermediary forms are observed. The surface of the organ usually presents papillary dendritic excrescences, to which the tumour owes its name.

As varieties of these villi, one meets long, pediculated forms floating in the urine after the manner of aquatic plants with narrow leaves, and with warty papillomata with a verrucose surface (*Thompson's* "fimbriated papilloma").

From the histological point of view, a "villus" is composed of connective tissue proceeding from the submucosa, and presenting fibrous tracts at the base, containing smooth and muscular fibres and fusiform cells, in which, according to *Tschistowitsch*, the vessels are buried which furnish the genuine papillary substance. From these vessels the capillaries originate. The epithelial covering has the appearance of the bladder epithelium, the stratum of which is, however, much less firmly and closely

united, and must be rather considered as a loose covering of the fine matrix of the fimbriated papilloma. *Cahen* has recently described forms developed on nodules made up of epithelial covering, and probably due to proliferation and to coalescence of the papillæ, resulting from catarrh of the bladder. We ourselves have twice observed these forms.

Villous tumours are more prevalent in the male sex, and are usually situated at the base and trigone. If the tumour develops in the region of the neck of the bladder, local disturbances, so often discussed, are frequently observed, such as retention of urine and hæmorrhages, which may rapidly prove dangerous. Contrary to what happens with cancer, when dysuria and pains soon appear, and even usually precede hæmaturia, the latter may sometimes for years remain the sole predominating symptom in the clinical type. Hæmorrhage from fine floating villi sometimes proceeds from the slightest mechanical irritation, such as contraction of the bladder, and thus seems to be spontaneous. This phenomenon is the direct consequence of the histological structure of the tumour (*Virchow*). However, in spite of numerous statements to the contrary, we cannot look upon these forms of hæmaturia as pathognomonic in the case of vesical tumours. Certain forms in which new growths possess a more firm consistency may be tolerably long supported by the patient without discomfort or harm. As in carcinoma villosum, spontaneous expulsion of the excrescences is also observed. For details *re* diagnosis see preceding section.

Prognosis and Treatment of Tumours of the Bladder.—There is perhaps hardly any morbid condition the treatment of which has undergone such a thorough modification. This modification is due to the great progress made in surgery, and to modern processes of diagnosis. In spite of some good operative results (*Thompson, Guyon, Antal, Schlechtendal*, and others), this favourable influence on prognosis is much less applicable to cancer of the bladder, which usually remains an incurable affection, than to benign forms of tumours. The greater number of these affections, and especially the papillary tumours, are a source of serious danger to the patients. The successes obtained by modern surgery cannot be too much applauded. With regard to malignant new growths, judicious operative treatment often produces temporary relief. We may hope for greater success when an early diagnosis is possible. At the present time, however, the ultimate fate of patients is at times, unfortunately, uninfluenced by the immediate favourable and encouraging result of the operation (*Czerny*).

The question of the operative method has not been discussed by *Thompson* and *Guyon* with less energy than that of surgical diagnosis, with which it is so closely related. On this point there is a certain amount of agreement, and *Thompson* himself admits

that, for large, multiple, malignant tumours, occupying the base of the bladder, the high operation is decidedly preferable (*Sabatier*), while the perinæal incision is at its best applicable to simple benign papillomata. For benign papillary tumours, *Guyon's* method is, however, sometimes indicated (*O. Koch*).

The possibility of forced dilatation of the urethra has permitted us for many years to remove such tumours in women by sharp-spooning by means of lithotriptic instruments, by wire loops, by the eye of the catheter, and by galvano-cautery and thermo-cautery, etc. All these procedures have given good results. Forced dilatation of the urethra has thus acquired in women a considerable value from a diagnostic point of view, and colpocystotomy from a therapeutic one (*Kaltenbach*). In the case of large tumours or of tumours which, by their situation and shape, will not allow of the latter measures being employed, there still remains the high operation, with which a certain number of surgeons have had good results; amongst others, *Küster*, *Dittel*, *Antal* (sixteen cases, four successes), *Nitze* (ten cases, five permanent cures). *Ebenau*, *Iversen*, *Kümmell*, and others (*Harrison*, *Riedel*, *Rauschenbusch*) preferred *Thompson's* perinæal incision, which has the advantage of perfect drainage and offers less danger of hæmorrhage. Perinæal incision has in certain cases been combined with the high operation (*Billroth*, *Volkmann*, *Bruns*, *Southam*).

Partial excision of the bladder has also been tried (*Sonnenburg*, *Antal*); while *Novaro's* recent proposition to extirpate the whole bladder, and to sink the urethra in the rectum, an operation borne by dogs, has been tried by *Bardenheuer* on the human body (one case, which terminated fatally).

For details of operative technique, we refer our readers to surgical text-books. By preference, a sharp spoon is used, which, in the hands of *Morris*, *Godlee*, *Hofmokl*, and *Mori* has given very good results, especially in cases of papilloma. We are not yet in possession of sufficient statistics to judge in a general way of the results recently obtained. Conscientious statistics have been published by *Pousson* (63 good results in 106 cases of vesical tumours), by *Stein* (98 cases, including 53 men, of which 17 died and 17 were cured, and 45 women, of which 29 were cured), and by *O. Koch* (41 cases—33 by perinæal incision, with 5 fatal cases directly after the operation, and only 7 permanent cures).*

* *Battle*, "Carcinoma of the Urethra and Bladder; Removal of the Growth, with Closure of the Resulting Subpubic Wound, and Establishment of Permanent Suprapubic Drainage": *Lancet*, vol. i., 1895.—"Primary carcinoma of the periurethral tissues in the female is a rare disease, and little has been written about it. There are many monographs on urethral caruncle, but few on other new growths of this part. The contrast between the symptoms produced by the growth in this case and the distress caused by the much less dangerous urethral caruncle is very marked. In the former there was merely pain when the bladder

Thompson himself notes, out of his 20 cases (18 men), 11 deaths and 3 permanent cures. Certain cures of vesical cancer by the high operation are not known (*Ebenau*). Spontaneous

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became over-distended in consequence of the mechanical obstruction caused by the growth; in the latter the symptoms are very severe and occasion great distress, resembling very often those produced by stone, and are not infrequently increased by a cystitis. We have only found one case recorded of similar disease in which the same method of operation was carried out. *Dr. J. H. Dunn* had a patient under his care for recurring malignant disease, which involved the bladder, vagina, external genitals, and inguinal glands. He operated in two stages: firstly, he removed the inguinal glands and performed the first stage of a cystotomy, the bladder being opened on the fifth day; he then removed the growth, and sutured the bladder wall in front to that behind. The treatment of the resulting wound in the bladder differed from that adopted in the following case. The condition of the patient was satisfactory five months after the operation. 'By using a catheter four to five times in twenty-four hours she was comfortable and in perfect control of the urine, and never soiled by overflow day or night.' The account of this case is from the notes of *Mr. Wheeler*, dresser.

"The patient, a widow, aged sixty years, who had had children, was sent to *Mr. Battle*, in the out-patient department, by *Mr. Sydney Fairland* on March 20, 1894. She was a stout, red-faced, emotional woman, who complained of pain, the result of being unable to pass urine. She had had attacks of retention of urine on and off for from three to four months, for which she had to seek medical advice. There had not been much pain, excepting when the bladder became distended; then the pain was very severe. A catheter had frequently been required to give relief. She had not noticed any vaginal discharge or unusual swelling, had not lost flesh, and her general health was good. The family history was indefinite. She had not suffered from any serious illness. As the woman was suffering from retention of urine and was in considerable pain, she was sent up to the ward at once, and relief was afforded by catheterism. The urethra was the site of a new growth, which was evidently the cause of the obstruction. Further examination, next day, showed this growth to be very hard, rounded, and nodular, completely surrounding the urethra along its whole length and reaching up to the bladder. The finger could be just passed beyond the limits of the growth, which was movable over, but in close relation with, the rami of the pubes on each side. No ulceration could be detected, and there was no area of softening, the mass being of uniform firm consistence. There was no bleeding when the catheter was passed. There was no abnormal enlargement of lymphatic glands to be detected. The urine, withdrawn with a catheter, was thick, with a deposit of muco-pus, and showed about a third albumin; there was no blood. The abdomen was well covered with fat and had thick walls. The patient appeared to be quite healthy, excepting for the growth and its effects. Until the operation it was always necessary to draw off the urine with a catheter, the patient becoming much distressed at times from the retention, and quite unable to pass urine without assistance. On March 22 she was placed under the influence of ether, and a suprapubic cystotomy was performed. The bladder was washed out, and then injected with a small quantity of boracic acid solution. No rectal bag was used. After incision of the bladder wall the sides of the incision were sutured to the edges of the skin wound on each side. A large drainage-tube was placed in the bladder, and the upper part of the wound was brought together with silk sutures. The patient was then placed in the lithotomy position, and the growth fully exposed by the use of Sims's speculum and retractors. An incision was made on each side from before backwards; the one on the right side extended to the bone; these were joined in front by a curved incision following the arch of the pubes in front of the clitoris; the whole of the mass beneath the pubic arch, including the attachments of the clitoris, was now rapidly dissected

improvement has been rarely observed, and then only in the case of small benign tumours (becoming detached).

Apart from surgical interference, the treatment remains, as can readily be understood, purely symptomatic and palliative. Prudent catheterism or dilatation in cases where the obstruction of the neck of the bladder by cancerous masses becomes imminent, astringent injections (solution of perchloride of iron, ergotin, etc.) where profuse hæmorrhage occurs, local treatment if necessary, drainage of the ammoniacal decomposed urine and of the products of the breaking-down tumour, accompanied by excessively fœtid odour—such are the means at the physician's disposal.

If the pains become intolerable—if they completely deprive the patient of rest and sleep—there must be no hesitation about employing the only remaining means of procuring some relief, viz., *injections of morphia.*

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back, the bone being bared. The upper limits of the growth were more accurately defined, and it was removed with the scissors by cutting through the bladder beyond it. The invasion of the bladder by the growth had extended further along the anterior than along the posterior wall, and, as the section had gone through the edge of the growth in front, an additional inch or more of the anterior wall required removal, leaving an opening through which three fingers could be passed. The bladder was in a condition of subacute catarrh. After the arrest of hæmorrhage, which was comparatively slight in amount, the posterior wall of the bladder was drawn forward and attached to the anterior edge of the wound by means of wire sutures. There was some tension on the stitches towards the right side of the wound, but the bladder was completely closed by the sutures, which brought the edges well together. Iodoform was used to the wounds, iodoform gauze was applied to the suprapubic wound around the drainage-tube, and plugs of the same gauze were placed in the vagina. Two days after the operation she developed bronchitis, and the temperature rose to 103° F. at night. She was delirious, abusive, excited, and tried to get out of bed at night. It was difficult to manage the suprapubic tube, as she tried to pull it out and interfered with the flow of urine through it. Possibly, in consequence of obstruction to the flow thus caused, some leakage took place from the subpubic wound. There was no sloughing. On the 30th the wire stitches were removed. The wound had closed very well, excepting to the right of the middle line close to the pubic ramus, where there was a small sinus surrounded by indurated tissue. Syringing with boracic acid lotion was carried out daily. She was still very noisy at night, but quieter during the day; the temperature had been generally above 103° in the evenings of the days which had intervened since the 24th, but the condition of the chest was improving. By April 3 the temperature had become normal, and the previous condition of excitement was followed by a period of depression, with low temperatures. The bronchitis cleared up, and the subpubic sinus diminished in size after the application of solid nitrate of silver. It had not closed entirely when she left hospital on May 23, but was not larger than a crow's quill at the surface, and the leakage was very slight when she walked about, but she refused to have anything done to close it. There was no evidence of glandular infection. She was in good health bodily and mentally, and apparently quite able to manage the apparatus (*Buckston Browne's*), which answered its purpose admirably. Microscopical examination of the growth showed it to be a carcinoma without cell nests."—W. H. G.

The appearance of *hairs* in the bladder (trichiasis, pilimictio) which are frequently, bona and mala fide, declared to exist, is generally a consequence of the communication of the bladder with dermoid cysts. We leave the description of these and other diseases caused by foreign bodies to pathological anatomists and surgeons.

NEUROSIS OF THE BLADDER.

In this section we will discuss the motor and sensory disturbances of the bladder unaccompanied by *serious organic lesions*. A special description of disturbances of sensibility is not necessary, for, as we shall see further on, this condition is subordinate to motor disturbances of contractility. For details on normal innervation of the bladder and the mechanism of micturition, we refer our readers to works on physiology. It will suffice to again repeat that the contraction of the detrusor, and consequently expulsion of urine, results from a reflex, which is less due to irritation of the sensory nerves of the mucous membrane of the bladder than to the distension of the walls of the same.

This hypothesis, brought into notice through the remarkable but insufficiently appreciated works of *Mosso* and *Pellacani*, has taken the place of the obsolete theory, according to which the desire to micturate and the expulsion of urine was due to the contact of a few drops of urine with the posterior part of the urethra.

By means of very exact plethysmographic measurements, and by observing the slightest contractions of the bladder without changing the intravesical pressure, these authors have been able to show through experiments made on women and dogs that the necessity of micturition is manifest under the same intravesical pressure, but independently of absolute repletion of the organ, and that the contraction of the vesical walls, similar to those of the cutaneous vessels, occurs in consequence of psychical emotions and insignificant irritations from outside (noise, conversation, approach of certain persons); that, in spite of the rapidity of this physiological act, it is slower than the contraction of voluntary muscle; that the importance of abdominal pressure in emptying the bladder, and especially of respiration, is exaggerated, as the muscular force of the bladder is quite sufficient to effect evacuation—it is a fact that a healthy individual leaves no "residual urine"; and, finally, that during micturition no relaxation of the internal vesical sphincter is manifested, but, on the contrary, all the muscles, the detrusor in a comparatively higher degree, contract.

The reflex centre is situated in the lumbar region of the spinal cord (*Goltz, Gowers, Gianuzzi*); the motor nerves lie in the lateral and posterior cords of the medulla (*Mosso* and *Pellacani*).

SPASM OF THE BLADDER.

Cystospasmus.

Etiology and Pathogenesis.—The causes of abnormal exaggeration of the sensibility of the vesical wall, manifested by the frequency and facility with which the detrusor and sphincter of the bladder are contracted, are very variable. Under this head a whole series of degrees exist which connect the physiological conditions with morbid phenomena. Examples of this kind abound. We must mention in this connection the bad habit of emptying the bladder on the slightest provocation, the frequent desire to micturate, which is observed in some individuals after various psychical emotions—post coitum, for example, after certain beverages, apart from the quantity consumed, especially coffee taken on an empty stomach—the impossibility to micturate in the presence of other people, facts which physicians have constantly occasion to study in their practice.

Our experience does not yet allow of a clear etiological division, based on the nerve distribution of the bladder (peripheral nerves, reflex centre in the lumbar region of the medulla, nerve tracts which conduct the latter to the brain). Apart from the secondary forms, ensuing from genuine affections of the bladder (cystitis, calculus, cystolithiasis, cancer, etc.), it is a fact that spasm of the bladder usually arises from a *general neurosis*, such as hysteria, hypochondria, nervousness, conditions generally complicated with chlorosis and anæmia. The greater number of the cases of vesical neurosis belong to the conditions aptly described by the older physicians as "*irritable weakness*," and known at the present time by the name of "*neurasthenia*," conditions often complicated with hysteria and hypochondria, and which frequently develop after bodily and mental overwork, violent psychical emotions, venereal excesses, masturbation, spermatorrhœa, divers affections of the urinary and genital apparatus ("castus raro mingit").

Intense cold, the use of certain drugs, drastic purgatives, sour wine, badly fermented beer (we have not been able to convince ourselves of the special action of this latter on the bladder), the introduction of surgical instruments into the urethra, appear to play the same etiological part, sometimes alone, sometimes only as an occasional cause, the patient generally suffering from the general conditions which we have enumerated.

The forms observed after the inflammatory processes in the vicinity of the bladder, such as irritation of the rectum by hæmorrhoids, fissures, new growths, peritonitic affections, dysentery, inflammatory uterine diseases, catarrh of the prostatic portion of the urethra, may be considered as symptomatic, and do not belong to the class of neuroses in the strictest sense

of the word. The relations between spasm of the bladder and spinal and cerebral affections, which appear as a premonitory symptom, are still obscure (see "Paralysis of the Bladder").

White mentions irritability of the bladder and urethra, combined with frequent strangury, and later on with incontinence, as being due to certain occupations (engine-drivers, etc.).* The most efficient prophylaxis and treatment in the case of engine-drivers is therefore the substitution of a soft spring seat for the hard small seat, and in that way to do away with the vibrating of the engine.

In a certain number of cases no causal factor can be made out. We have seen robust individuals of blameless reputation, and without any other "neurasthenic" manifestations, suffer from this affection for years.

Children and adults are equally affected, but the female sex predominates.

SYMPTOMS.—From a theoretical point of view, spasm of the sphincter is clinically manifested by difficulty in satisfying the normal desire to micturate, and spasm of the detrusor (cysto-spasmus) by an abnormal desire. This sharp division, still maintained by a certain number of authors, is seldom clinically observed. In the majority of cases the spasm affects both the sphincter and detrusor. We therefore prefer to avoid a distinction which does not agree with our knowledge of the anatomy and physiology of the innervation of the bladder.

For the same reason, it seems to us right to include *disturbances of sensibility* in the symptomatic picture of spasm of the bladder, as contraction of the bladder is almost always accompanied by *pain* (*tenesmus*); genuine neuralgia vesicæ (cystalgia) is a clinical rarity. The great frequency of this combination has long led English authors to admit the morbid type of *irritable bladder*. But it is easily understood, as we have explained in several publications, that in cases where this condition, which does not exactly correspond to cystalgia, neuralgia, dysuria, etc., is accompanied by *inflammatory* conditions of the bladder, it can only be considered as a catarrhal symptom. It is therefore necessary in these cases to refuse it a right of asylum with respect to the other independent "idiopathic" forms, which, unassociated with local inflammation, belong to this section—*i.e.*, to the group of vesical spasm, without structural disease of the organ. Thus, in analyzing the works recently published on this subject—amongst which we desire to specially mention the remarkable researches of *Hartmann*, *Monod*, *Gauthier*, and *Peyer*—we exclude, as especially painful, cases of catarrh ("cystite douloureuse"), all those accompanied by cystitis, tumours of the bladder, and urethritis. Nevertheless, mixed forms certainly exist.

* Whether bicycling has a detrimental effect remains to be proved; at any rate, a soft spring saddle is advisable.—W. H. G.

The distinction between *nervous* and *idiopathic* irritation of the bladder appears to us uncertain, for our personal experience teaches us that between the limited and localized affection of the bladder, and that which belongs to the symptomatic picture of neurasthenia, a series of intermediate conditions exist.

In general, spasm of the bladder, as we understand it, constitutes the predominant symptom of the "irritable bladder" characterized by *abnormal frequency of micturition*, inasmuch as the accumulation of an insignificant quantity of urine causes an increasing desire to evacuate, which repeats itself every quarter or every half hour ("pollakiuria"), or is sometimes almost incessant.

The urine itself flows with painful straining drop by drop, or in small quantities (spasmodic dysuria). The cessation of the spasm of the sphincter—and the existence of this latter is proved by the concomitant presence of other particularly obstinate spasms; hence the denomination "stuttering urinary organs"—changes the aspect of the flow of urine, which, formerly thin and interrupted, becomes full and vigorous. Involuntary emission of urine into the clothes or bed, under the influence of the non-counteracted contraction of the detrusor muscle (enuresis spastica), constitutes the most disagreeable complication of this condition, already sufficiently painful.

At other times a complete retention of urine (ischuria spastica) occurs, compelling the patient, after vain attempts to satisfy the desire to micturate, to have recourse to the practitioner to empty the bladder.

The pains which are observed in these cases, and which vary from a sense of discomfort or slight burning to intolerable pain, present the characteristics already referred to. They radiate from the principal centre—*i.e.*, the neck of the bladder—into the urethra, the genital organs, the anus, and are sometimes accompanied in children by reflex defæcation. They may even involve the sacral region, the abdomen, the upper and lower parts of the trunk. The distribution of the hæmorrhoidal plexus which innervates the bladder and the intestines, the reflex irritation of the splanchnic nerve (*Peyer*), the anatomy of the lumbar and sacral plexuses, sufficiently explain the pathogenesis of these "lumbar and intestinal symptoms," amongst which *Hegar* also places lumbar weakness, cold feet, aching in the flank, etc. In serious cases, the patient is sometimes attacked by violent excitement, terror, nausea. Free sweating sets in, and convulsions often complete the clinical picture. The attacks often torment the patient day and night, and usually last a few minutes. Intervals of rest generally follow.

Recurrence of the paroxysms is especially painful. The moral effect on the patients is to preclude any idea of social intercourse.

The course of the affection is very variable. It is in all cases

capricious, and more frequently chronic than acute. Remissions, even spontaneous recovery, are not rare.

Apart from the secondary forms of the affection resulting from inflammation of the bladder, etc., the urine of these patients contains neither *abnormal constituents nor albumin.* Often, but not in the majority of cases, the urine is of a pale colour, and the specific gravity is nearly normal (urina spastica). Sometimes the urine is very abundant, and in cases of neutral or alkaline reaction it becomes hazy at the moment of emission, by depositing earthy phosphates. *Peyer* has recently thoroughly studied this "phosphaturia." When the catheter has once passed, or has overcome the spasm of the sphincter, it readily enters the bladder.

DIAGNOSIS.—The appearance of the urine just mentioned, the insensibility of the vesical region to pressure, and the apyretic evolution of the affection, allow us to distinguish between essential spasm of the bladder and the forms resulting from inflammation of the lower urinary tract and from cystolithiasis. The symptomatic type sometimes bears a striking resemblance to the latter disease. It is easily understood that lithotomy is often practised under these conditions in consequence of false diagnosis.

We cannot insist too strongly on the prudence necessary in interpreting the positive results furnished by microscopic examination of *women's* urine. In cases of leucorrhœa, only urine obtained by the catheter should be used for examination.

The numerous cases which have been sent to us as *catarrh of the bladder*, and which, on careful examination, have proved to belong to the class of neuroses, justifies the reservations we have insisted on.

Judicious catheterism with a bougie or sound may be of great assistance in diagnosis. An experienced and prudent physician can always overcome the obstacles occurring from spasm of the sphincter (*cf.* "Spasm of the Urethra"). Inexperienced practitioners often mistake the condition for stricture (*cf.* the latter). In cases of necessity, catheterism under chloroform must decide these difficult cases.

PROGNOSIS.—The prognosis is so far favourable that spasm of the bladder does not endanger life. But, on the other hand, this affection, which in serious cases embitters to a great extent the patient's life, must be considered serious. Acute forms due to temporary causes (certain drugs, drinks, catheterism) have usually a rapid and mild course. Chronic forms are equally often susceptible to spontaneous recovery. Genuine cases seldom last a year.

TREATMENT.—The causal indication depends on the etiology. Abstinence from venereal excesses, suppression of masturbation, suffice in the majority of cases to fully remove the disease. Regular diet and prevention of all over-exertion in the widest sense of the word often produce excellent results.

The importance of a methodical treatment of neurasthenia, when this condition appears as the fundamental disease, is considerable, and, like *Guyon*, *H. Hartmann* and others, we have been long convinced of the superiority, in these cases, of the general over the local treatment.

As *symptomatic* treatment of the attacks, the most efficacious is the local application of *warmth* and *narcotics*. Hot fomentations in the region of the bladder, warm hip-baths and enemata, introduction of a hollow metal cannula into the rectum with warm water irrigation, warm baths of long duration, and, in cases of urgent necessity, warm intravesical injections of a neutral fluid, or, better still, of sterilized salt solution—such are the means we have at our command. With regard to drugs, one should not waste time in prescribing mild sedatives and antispasmodics, but give morphia at once (internally, subcutaneously, as enema, or in suppository), which makes bromide of potassium, cannabis indica, and especially lupulin, camphor, and valerian preparations, unnecessary. In especially serious cases, chloral or chloroform may be given, either alone or alternately with morphia. Sometimes the local application of cocaine is of great service. *Bellamy* warmly advocates the introduction of cocaine bougies into the urethra. We do not understand the advantages expected from the administration of iodine, arsenic, turpentine, etc. Obstinate retention of urine may call for the catheter. Methodical treatment of spasms of the bladder with soft elastic or metallic bougies and sounds has found warm advocates (*Civiale*, *Pitha*, *Lebert*, *König*, *Ultzmann*, and others). It is evident that in such a case, where the mucous membrane of the bladder is quite healthy, great care is necessary in order that the patient may not suffer even more than an attendant vesical catarrh—often the therapeutic effect of special treatment. We are not as a rule enthusiastic with regard to local treatment, any more than with regard to injections of nitrate of silver and the application of astringents by means of a porte remède (see "Treatment of Gonorrhœa"), as recommended by *Oberländer* and *Peyer*, a method certainly of great value in secondary forms, complicated with inflammatory conditions of the bladder and of the urethra. On the other hand, we have obtained good results with the "psychrophor" (see "Treatment of Spermatorrhœa"), although not so frequently as *Peyer*. We should be prepared to agree with the latter author in admitting that local treatment of the irritable bladder is decidedly necessary, and that nothing is more harmful than sending patients to watering-places or on journeys, if we had not seen numbers of cases where the patients, having escaped the hands of specialists, returned much improved, and even cured. Even in prolonged and obstinate cases change of climate and the use of baths have proved efficacious. It is a remarkable fact that the

results obtained by sea-bathing, thermæ, and hydrotherapy are practically the same.

Electric treatment is, in our experience, only exceptionally successful.* The real value of this treatment is only seen in cases of vesical paralysis (see below).

For specially rebellious cases, *Vincent, Stein, Monod, Oberländer* and *Gauthier* advise rapid dilatation of the urethra, also in the male eventually after incision of the membranous portion. In desperate cases cystotomy and drainage of the bladder have proved efficacious (*Weir, Thompson*). We do not, however, think that purely nervous non-inflammatory forms demand such radical measures.

PARALYSIS OF THE BLADDER.

ATONIA, PARESIS, PARALYSIS OF THE BLADDER, CYSTOPLEGIA.

We include under this title the conditions of functional muscular inadequacy of the bladder of various degrees of intensity, inasmuch as these conditions are made manifest in the shape of "neuroses," and are not accompanied by *coarse* anatomical lesions of the viscus (injuries often resulting from difficult labours, inflammations, neoplasms, etc.). We will not here mention the forms proceeding from disturbances in the motor tracts—for example, in cases of spondylitis (*Anton*)—inhibition of conduction, paralysis of the motor centres in cerebral and serious spinal affections (apoplexy, tabes, myelitis, etc.). These forms may, in fact, be considered only as a symptom of the individual diseases enumerated. We would call attention to the fact that the normal functions of the bladder and rectum depend on the integrity of the lower segments of the spinal cord below the lumbar ganglion ("spinal ano-vesical centre"), or on the nerves originating from it (pudendal and coccygeal plexuses), a fact clearly proved by *Rosenthal's* and *Bernhardt's* clinical observation. *Enuresis nocturna*, a functional anomaly *sui generis*, must be discussed separately.

ETIOLOGY.—The forms which, after what we have said, may rather be considered as independent, have the same etiology as spasm of the bladder. Hysteria, hypochondria, neurasthenia, venereal excesses, masturbation, and certain drugs (especially opium), must also be taken into account. Then, too, dilatation of *the walls of the bladder*, resulting more or less from marked functional impotence of the detrusor muscle, must be considered.

* The removal from the accustomed *milieu*, with all its petty cares and worries, with its bodily and mental exertions, from the wear and tear of everyday life and its social duties, plays doubtless the most important part, and, together with change of air with the regularity of a carefully directed hygienic, dietetic and psychical treatment, effects in most cases a cure, whether at the seaside, in a watering-place, or in a hydropathic establishment.—W. H. G.

The modifications which may exist in these cases in the muscular fibres and the peripheral terminations of the nerves have not been studied. To this category belongs *neglect* of regular micturition either from bad habit or modesty (such cases are intermediate between physiological and pathological conditions), or, again, from impairment of the sensorium, as in the course of serious, especially pyrexial general disease (typhoid fever). This latter class includes cases coming under paralytic conditions of the bladder of cerebral origin, as well as those forms observed as a symptom in general debility following chronic affections, and terminating in *marasmus*, or seen in advanced age. "Myopathic" paralysis only differs from neurosis in that the former is generally due to fatty degeneration of the muscular fibres of the bladder (*Dittel*). The forms produced by retention of urine apart from bladder troubles, such as stricture of the urethra, hypertrophy of the prostate, prolapse of the uterus, etc., do not belong to this category. Finally, functional paralysis of the bladder is often observed during labour or after laparotomy, in the latter instance especially when an operation has been performed in order to remove large abdominal tumours. In these cases, as *Schwarz* has shown, the intra-abdominal pressure must be taken into consideration. The experiments we have already referred to sufficiently prove that evacuation of urine is not due to the effect of this abdominal pressure only, a view which involves the assumption that the viscus must be regarded as a passive reservoir. Nevertheless, we have observed several cases in which retention occurred when the abdominal pressure had ceased to exert its action, the bladder muscles being at the same time normal.

Symptoms. — Paralysis of the detrusor muscle shows itself clinically, on theoretical grounds, by retention of urine (retentio urinæ, ischuria paralytica), which persists until the amount of fluid in the bladder overcomes the resistance of the sphincter. On the other hand, incontinence of urine (incontinentia urinæ, enuresis paralytica) corresponds to paralysis of the sphincter. Apart from paralysis of the sphincter, resulting from *mechanical* obstacles and produced by traumatic and morbid affections of the bladder and the adjacent organs, such genuine cases but seldom come under clinical observation. In the majority of cases the sphincter is attacked at the same time as the detrusor. Paralysis of the detrusor, which produces considerable distension of the bladder and increase of pressure, is usually followed by weakening of the sphincter. Thus, it happens that patients, apart from cases where retention of urine occurs suddenly, complain of the increasing slowness and difficulty they experience before being able to entirely empty their bladder. The desire to micturate occurs less and less frequently, and, if not immediately satisfied, disappears. The flow of urine, interrupted at every moment, and no longer energetically ejected, but trickling away, does not correspond to

the efforts made by the patient during micturition. In the dorsal position especially the emission of urine is difficult, and micturition is assisted in the sitting position by the action of abdominal pressure. At the end of micturition the patient does not feel relieved. He is conscious that there is still urine in the bladder, but he has no idea of the quantity. In such cases the catheter must be used to completely empty the bladder, which in serious cases rises above the symphysis pubes. In certain cases belonging to those forms where there is a mechanical obstacle to micturition, the bladder is distended up the umbilicus, and is converted into a thin and transparent cyst, capable of containing several quarts. We have seen a case where the bladder contained 5 quarts, and *Willard* one where it contained 14, the bladder being distended to over the size of the uterus containing a mature child. If the urinary pressure becomes equal to the blood pressure, the secretion may be totally arrested and uræmia may set in, as has been observed as a sequel to ligature of the ureters in animals.

Insufficiency of the sphincter, either appearing in the course of paralysis of the detrusor or manifesting itself by incontinence, is, as *Casper* rightly remarks, an unsuitable term, as in these cases the bladder generally contains a considerable quantity of "residual" urine, and thus in reality retention exists. At the onset incontinence only shows itself in a decided manner under certain influences (sneezing, coughing, laughing, stooping). Later on genuine alternatives of ischuria and incontinence are observed. As in the case of those suffering from paralysis of the bladder, these patients are obliged to have a vessel in constant readiness. Such patients are cut off from all society.

In cases where the function of both muscles has ceased, the bladder may be compared to a reservoir with immobile walls, taking in the liquid on one side and letting it out on the other. The bladder, constantly refilled, allows a constant stream of urine to flow away, the patient being unconscious of it. This is "ischuria paradoxa." Very frequently, under the influence of conditions already mentioned, stagnation leads to ammoniacal decomposition, secondary cystitis, pyelitis, uro-sepsis, complications which usually prove fatal sooner or later.

Diagnosis. — In very marked cases the diagnosis may be arrived at from the characteristic clinical picture. The absence of painful vesical tenesmus allows of the distinction being made between paralysis and spasm of the bladder; nevertheless, we emphasize the fact that mixed forms exist, in which at times the paralytic phenomena, and at others the spasmodic symptoms, are the more prominent. We allow that with hysterical persons, sometimes suddenly attacked by retention of urine, and necessitating the use of the catheter for days and weeks, we have often been puzzled to say whether it proceeded from paralysis of the detrusor or from a spasm of the sphincter, when the two

diagnostic symptoms—the sensation caused by the catheter during catheterism, and the force of the urine passing through the catheter—have failed. Similar facts have been observed by *Engesser*.

Considerable distension of the bladder can be made out by palpation and percussion. In doubtful cases (the distended bladder has been confounded with ovarian cysts, gravid uterus, and even with ascites) the catheter should be used. A quantity of urine is in such cases often drawn off, to the surprise of the physician as well as of the patient, and at the same time clears the ground as to the presence or absence of mechanical obstacles to evacuation of the urine.

PROGNOSIS.—In a general way, the prognosis of paralysis is less favourable than that of spasm. Incomplete paralysis, especially when occurring suddenly, when accessible to treatment, is most quickly and completely cured. Even fairly severe chronic forms may be overcome where the patients are vigorous, while with old people the only result to be attained is the suppression of the serious consequences. If in the latter cases residual urine has accumulated, and been present in any considerable quantity in the bladder for a few weeks, this quantity remains constant and persistent. Ischuria paradoxa is the most hopeless form; apart from the incurability of the primary disease, such as serious affections of the central nervous system, ammoniacal fermentation with inflammation of the urinary passages and kidney, and also general uro-septic infection, must be taken into account.

TREATMENT.—Slight cases can be improved by recommending the patient to empty the bladder regularly, and to avoid micturating in the recumbent position. When patients cannot empty their bladder completely and spontaneously, the catheter must be used, and this should be done at once in cases of complete retention of urine. If the current of urine which flows out through the catheter (the force of which is determined by the elasticity of the bladder walls and the action of abdominal pressure) becomes weaker, the flow of urine must be stopped. The advice given by some writers, to facilitate the evacuation of the bladder by coughing, by passive compression of the abdomen, by standing, seems to us dangerous. Sudden evacuation of the whole of the urine present may in such cases be followed by very serious syncope, not to mention the dangers which may result from the effects of a negative intravesical pressure (*Born*) on the thinned and distended walls of the bladder. Nevertheless, catheterism may be applied in cases of paralysis of the detrusor muscle, complicated with diminution of the intra-abdominal pressure, when the residual urine has reached to about 250 cubic centimetres. According to *Casper*, it is even indicated when the residual urine amounts to 100 cubic centimetres, but we are not entirely of his opinion. Naturally, catheterism must be employed

with all possible antiseptic measures. It is best to use soft elastic catheters, the manipulation of which intelligent patients soon get to understand. But even with these catheters an awkward movement may send them in the wrong direction and lead to urinary infiltration, which often proves fatal. If this should unfortunately occur, no further attempt with the soft catheter should be made, especially when the bladder is over-filled, but a fairly large metal instrument should be employed, contrary to the usual practice of beginners, who choose small-calibre catheters. An anæsthetic should be used if necessary. Disinfection is of the greatest importance, and prevents cystitis when signs of inflammation are absent. The theory that cystitis is the necessary consecutive evil of methodical catheterism only proves that the physicians who share this opinion do not attribute sufficient importance to scrupulous cleanliness in these cases. It is certain that it is sometimes impossible to avoid catarrh of the bladder as a sequel to one of the causes which we have enumerated.

In rare cases a most serious complication occurs, viz., hæmorrhage from the whole urinary apparatus. To avoid causing serious inflammation, the catheter must not be left for any length of time in the bladder; but sometimes this is unavoidable, especially in cases where the introduction of the catheter into the bladder has been very difficult. If the urethra be especially sensitive, emptying the bladder by manual expression (*Brassetti, Heddæus*) may be tried.

Local application of *cold* in different forms (evaporating lotions, douches on the hypogastric region, syringing, intravesical injections, etc.) is as good as the application of heat intended to combat spasm of the bladder. In all cases, according to our personal experience, cold constitutes a very valuable adjuvant, and is certainly preferable to drugs employed to overcome motor paralysis.

Amongst these drugs, strychnine, recently so much recommended by *List* and *T. L. Roth* for senile forms, ranks first. Up to the present time we have obtained no more remarkable result with strychnine than with camphor and ergotin, which have been likewise warmly recommended for paralysis of the bladder. The effect of astringent injections seems to us questionable. We have not yet tried massage of the bladder region; it seems to us to be a dangerous proceeding.

In certain cases *electricity* has proved more efficacious than medical treatment. *Bäumler* and *Born* have, however, not observed manifest contractions under the influence of the current. *Erb* recommends in such cases the "percutaneous" method, the anode on the lumbar region, the cathode above the symphysis (when retention predominates) or on the perinæum (when incontinence prevails); further *internal application:* the *catheter* electrode is introduced as far as the neck of the bladder, and even into the same (*Bäumler* could not observe the action of the

current on the detrusor); finally, application by the rectum. Electrical treatment with the constant and interrupted current has given excellent results in hysterical forms of bladder paralysis, but it is just in these cases that one must be careful not to be deceived by simulation. In many cases electrical treatment is quite useless, without the reason of this peculiarity being discoverable.

The application of counter-irritation above the symphysis pubis, on the perinæum, or in the sacral region, is purely theoretical. It is meant to excite, by reflex action, the activity of the muscles of the bladder by irritating the sensitive nerves of the neighbouring regions. But the practical results are very doubtful.

Hydrotherapy, strengthening diet, gymnastics, change of air, sojourn in the country, in the mountains, and at the seaside, with a view to improving the general condition, are of great therapeutic value. Carbonic chalybeate waters and mud baths are sometimes of great use.

The treatment of complications, such as ammoniacal decomposition of urine, cystitis, etc., has already been discussed.

Vessels for the reception of urine (urinals), made of india-rubber and fastened to the genital parts, enable patients suffering from incontinence to keep their clothes dry and preserve the skin from ulcerations produced by the continual flow and decomposition of urine; these reservoirs also considerably diminish the odour of decomposition. The form of these urinals is described in all surgical works and illustrated catalogues. The use of these urinals does not exclude the necessity of strict cleanliness of the body by means of frequent ablutions and baths. *Squire* has constructed an S-shaped catheter which, without disturbing the patient, can be fixed into the urethra, and be closed or opened at pleasure by means of a tap.

The process of occlusion of the urethra by means of special *compressors* of the penis is not at all to be recommended; the apparatus can only be borne for a short time (see "Treatment of Enuresis Nocturna"). In our wards we have sometimes introduced into the urethra of old women a small apparatus in the shape of a dumb-bell made of hard indiarubber, and have obtained good results. The bent middle portion of the apparatus must not greatly exceed the length of the urethra, and the diameter of the enlarged extremities must not be under 1 centimetre. This instrument must be removed three or four times a day, and re-introduced after micturition. Some patients are very ingenious in the removal of the small apparatus which prevents them from indulging in the habit of wetting the bed.

Fritsch has been able to cure the most obstinate cases of paralysis of the sphincter in women by partial vaginal excision.

ENURESIS NOCTURNA.

Nocturnal incontinence of urine usually originates from the defective education and the bad treatment of children, especially those of the lower classes, hereditary stigmata which exist in families of all classes. The practical importance of this well-known affection, and its pathogenesis, distinct from that of the other forms of incontinence which we have hitherto discussed, justifies our devoting a special chapter to it.

PATHOGENESIS, ETIOLOGY, COURSE. — Observant children's physicians well know that the little patients who wet their beds belong to many different categories. Impartial observation proves that the affection in question may show itself in well-brought-up but evidently nervous children, even *during the day* and when they are awake. These forms are quite distinct from those proceeding from serious general weakness, defective development of the intellectual faculties, local inflammatory affections (cystitis, vulvo-vaginitis, lithiasis, etc.). The affection may show itself when the child coughs, sneezes, laughs, engages in gymnastic exercises, plays, etc. Such children are usually falsely accused of resisting the desire to micturate too long. There certainly are children who, absorbed by the occupation of the moment, especially when playing at games, resist the desire to allow it to pass; but these children are never attacked by enuresis nocturna, and do not therefore belong to the category we are now studying.

In another class we place the children who unconsciously pass urine *only during the night*, and they form the greater proportion. Intermediate between the two, cases presenting mixed and transitional forms are met with, but it is not possible to admit that diurnal enuresis is a necessary adjunct of a nocturnal incontinence, when the latter has existed for a varying period. *Townsend* very rarely met with enuresis diurna, and with mixed forms only in a third of the cases of enuresis which he observed.

There are, of course, a certain number of *badly-brought-up* children who, either from bad habit or from laziness, micturate in bed. These cases are, however, much rarer than parents and physicians usually admit.

It is hardly necessary to remark that in those cases where enuresis nocturna only *seldom* occurs—for instance, after extraordinary but occasional fulness of the bladder—it can never be a question of pathological incontinence. In those cases where children micturate in bed, they dream they are on the night-stool, and that they are somewhere where micturition is allowed. Healthy adults may also be attacked by this kind of enuresis.

Cases due to a kind of physiological habit, which occur occa-

sionally in children of three or four years of age, are not strictly cases of enuresis nocturna.

The pathogenesis of enuresis nocturna belonging to the two first categories is still somewhat obscure, in spite of the number of works published on the subject. It is very probable—and our opinion is the outcome of an ever-increasing experience—that the condition arises from various, and to a great extent unknown, fundamental causes. In order to explain this condition, nothing is more natural than to suppose that abnormally deep sleep prevents the patient feeling the necessity to micturate. But, on the other hand, it is a fact that the majority of children who sleep very soundly do not wet their bed, and that, as *Ultzmann* rightly remarks, the children who are frequently awakened in the night, for the purpose of passing their water, wet their bed shortly after having emptied the bladder and fallen asleep again. *F. von Niemeyer*, while admitting a decreased sensibility of the nerves of the bladder, and a *relatively* deeper sleep than in a normal condition, considers the affection to be anæsthesia of the bladder. According to *Bókai*, a disturbance of the equilibrium in the functions of the motor muscle must be taken into consideration; whereas when the patient is awake the sphincter counteracts the action of the detrusor of the bladder. During sleep it is this latter (which, according to *Dittel*, is relatively more developed in children than the prostate and sphincter) which overcomes the resistance of the sphincter, all the more as the child is unconscious of the desire to micturate In those cases where incontinence shows itself during the day, it cannot be attributed to the action of sleep, and in these cases we are obliged to admit of the existence of spasmodic or paralytic enuresis. In the former it is connected with a spasm of the detrusor—and this is *Gerhardt's*, *Desault's*, and *Bradbury's* opinion—in the latter case with defective innervation of the *sphincter* (*Trousseau*, *Bretonneau*, *Ultzmann*).

In some cases a certain importance may be attributed to congenital debility of the sphincter, a factor which plays no part in acute forms capable of being cured. We know nothing certain as to the exact seat of the functional disturbances (brain, spine, peripheral nerves). *Oberländer* again advocates the theory of congenital insufficiency of the muscular force of the sphincter and the posterior part of the urethra, a theory which he enlarges by admitting the existence in the *urethra* of pathological conditions (slight congestion) which act as reflex irritation. Finally, a causal relationship between enuresis and phimosis and synechia of the prepuce (*Smith*, *De Fortunet*, *Magruder*) has lately been insisted upon. Unfortunately, the frequency has been too much emphasized, and the proportion of 90 per cent. attributed to these conditions cannot be admitted by any physician.

The special etiology of enuresis nocturna is, apart from that attributed to faulty bringing up, so to say, unknown to us. In

accusing rachitis, scrofula, anæmia, bad nourishment, it must not be forgotten that, on the one hand, the greater number of children belonging to these categories do not suffer from enuresis nocturna, and, on the other, vigorous children, enjoying good health, are attacked by nocturnal incontinence. Thus, the affections which we have just enumerated may at the most play only a predisposing part. On the other hand, in many cases the existence of a "neuropathic predisposition" may be present, and in certain cases such neurasthenia may be acquired through masturbation. The intimate connection which, according to *Trousseau*, is supposed to exist between enuresis nocturna and epilepsy is not admitted by many physicians. According to our personal experience, the complication in these cases of morbid spermatorrhœa is not nearly so frequent as many physicians believe; irritable bladder is somewhat more frequent. A large quantity of liquid taken towards the evening, causing irritability of the bladder, may occasionally be considered as a cause. The opinions as to the part which must be attributed in these cases to irritation produced by intestinal worms are very divided.

We twice saw this affection in children's hospitals become epidemic in the course of a few days.

Everyone knows the symptoms of this affection. The two first hours of the night are the most critical period, enuresis seldom occurring towards morning. Intermissions of several nights, and even of several weeks, are not rare. There may be longer intervals — sometimes months. The accident almost always occurs but once in the night. Serious acute infectious diseases, inflammation of the urethra, sudden psychical emotions, may have a favourable influence on this affection (*Trousseau, Bókai*).

The majority of children are attacked by nocturnal incontinence of urine from the age of three to ten. *Ultzmann* is of opinion that the idea that boys more often suffer from this affection is an error, but parents always try to conceal the condition in girls. *Townsend* found, from his observations on 355 children, that the number of boys and girls was about equal. In the majority of cases the affection disappears towards puberty, and is very rare indeed after the age of twenty.

Diagnosis and Prognosis.—The *diagnosis* is easy, but each patient must be examined with the idea of the possibility of the existence of inflammatory processes in the urinary organs, of calculi, of vulvo-vaginitis, etc., in order to avoid errors.

After what has been said, the *prognosis* with regard to the final termination is favourable; at the same time, this painful and obstinate affection is one of those most difficult to bear. It is not only the general health which is influenced, by the incessant dampness of the bed and the clothes, but the child is often unjustly punished, and made the laughing-stock of playmates. The most obstinate forms occur in infancy.

TREATMENT.—The causal indication is difficult to find. In the majority of cases we are not able to distinguish between conditions of anæsthesia, hyperæsthesia, paresia, spasm, and for this reason some physicians prescribe *narcotics*, especially belladonna, hydrate of chloride, bromide of potassium. It is remarkable that is these cases morphia is so seldom used, even with older children, and *Williams* is the only authority who has drawn attention to the good effects produced by this drug. Personally, we only recommend morphia in cases of absolute necessity, and at considerable intervals. Other physicians give strychnine, ergotin, and astringents. *Smith*, who looks upon the affection as a reflex irritation due to the acidity of urine, recommends alkalies, and *Harkin* praises vesication and cupping over the nape of the neck as a "wonderful" remedy for hyperæmia of the medulla oblongata, which he considers the cause of the affection. The number of drugs employed is as great as the number of unsuccessful results.

From a pedagogical point of view, mechanical treatment of the disease is not indicated. Such treatment consists of nocturnal occlusion of the urethra by an elastic ligature applied every night round the prepuce, of the introduction into the rectum of *Trousseau's* "prostate compressor," or, with girls, of a kind of colpeurynter. Other reasons against these methods are that they are only applicable in the case of intelligent and older children, that they are borne with difficulty, and that their effect is very uncertain. The results are no better when occlusion of the urethra is attained by collodium, local cauterization of the urethra and of the neck of the bladder, or even circumcision. The introduction of a catheter à demeure, and catheterism in general, has not given the results expected by its promoters.

We are content up to now with the following prescriptions: *strict abstention* from all nourishment (eating and drinking) towards evening; *regular* micturition; methodical *cleansing* and *baths* (the choice between lukewarm and cold baths depends on the reaction of the organism, for the distinction *à priori* between spasmodic and paralytic forms is very difficult); no feather beds; finally, the application of the faradic current.

The effects of this last treatment, used amongst others by *Hertzka*, *König*, *Ultzmann*, *Erb*, *Berger*, are excellent in a large number of cases; but in others, as experience has taught us, electrical treatment is utterly useless, especially where all other kinds of treatment have been tried in vain. The good results which are obtained may be attributed to the energetic stimulation of the sphincter of the bladder. The anode should be applied over the lumbar region; the kathode is then applied above the symphysis or to the perinæum, or, better still, introduced in the shape of a special catheter into the urethra, into the bladder, or into the rectum. The last-named procedure is based on the relations which exist between the anal sphincter and the vesical

sphincter (*Ultzmann*). In some cases electricity applied a few times for five to ten minutes is sufficient to obtain good results. *Rossbach* thus succeeded in curing nocturnal incontinence of urine which had lasted twenty years. The practitioner soon discovers the uselessness of frequently waking the child during the night, in order to make him get up and stand on the cold floor, and then let him go back into bed. We do not consider it necessary to make any remark on these methods.

In cases where phimosis is present—a condition which must never be overlooked—it is proper to circumcise, or at any rate break down, the preputial adhesions, an operation which often—but by no means always, as some authorities assert—is followed by lasting results. *Oberländer* obtained excellent results from dilatation of the posterior urethra by means of his dilatatorium (see "Treatment of Gonorrhœa"), after *Sänger* had obtained good results for the same affection by dilatation of the urethra in women.

When enuresis resists all treatment, palliative measures are necessary, such as placing the patients on mattresses filled with antiseptic tow, which absorbs the urine. The cheap peat from *G. Neuber's* manufactory in Uetersen (Holstein) is excellent for this latter purpose. Of course it can only be used for *one* night.*

We leave the consideration of *wounds* of the bladder to surgery.

DISEASES OF THE URETHRA.

GONORRHŒA IN THE MALE.

GONORRHŒA, CONTAGIOUS URETHRITIS, URETHRAL BLENNORRHŒA, BLENNORRHAGIA AND PYORRHŒA, VIRULENT CATARRH OF THE URETHRA, CHAUDEPISSE.

ETIOLOGY AND PATHOGENESIS. — Gonorrhœa is a specific contagious disease; *its sole cause* is infection by the gonorrhœal virus, such as is found in the various genital secretions of women when suffering from corresponding affections. This virus is one of the best-known morbid agents, and it is strange that doubt with regard to contagion of gonorrhœa through certain micro-organisms should still be actually expressed, and the origin of the disease be referred to with reservations. They are specific microphytes, diplococci, first described by *Neisser* as "gonococci" in the year 1895. We cannot agree with *Bricon*, that *Hallier* described these micro-organisms in 1866. *Neisser's* statements have been completely confirmed by numerous authors (*Bókai*,

* Together with the use of the above-mentioned applications, we generally order the patient's bed to be arranged in such a manner that his pelvis is elevated by means of a cushion or bolster.—W. H. G.

Aufrecht, *Leistikow*, *Krause*, *Wolff*, *Eschbaum*, *Arning*, *Bumm*, *Zweifel*, *Welander*, *Loeffler*, *Lundström*, *Oppenheimer*, *Steinschneider*, *De Sinéty* and *Henneguy*, *Lomer*, *Fürbringer*, and others), especially as regards the morphology of this micro-organism. Although the possibility of cultivating them in meat peptone, gelatine, agar-agar, and animal blood serum, has been affirmed (*Fehleisen*, *Bockhart*, *Oppenheimer*, *Sternberg*, *Kreis*), but not proved, and *Krause*, *Leistikow* and *Loeffler* have succeeded in obtaining colonies cultivated in blood serum, decisive proofs have been furnished by *Bumm*, who, after numerous attempts, succeeded in obtaining undoubted cultivations of *Neisser's* gonococci by means of human blood serum taken from the placenta. The colonies appear at a temperature of 25° to 38° C.—33° to 37° is the most favourable temperature. The colonies are in the form of fairly extensive islets with sharp edges and are of a greyish-yellow colour. Our personal researches have, like those of other observers, given negative results when the inoculation has been made on substances free from serum; but we believe that it is advantageous to add a small quantity of sterilized urine, although in these cases the results are not always constant. The decisive proof of the pathogenic character of the gonococcus can only be furnished by successfully inoculating the mucous membrane of the urethra with a pure culture. *Bumm* has supplied this proof, for the results of *Bockhart's* previous experiments have been strongly disputed by *Loeffler*, and other writers. *Bumm* chose for his own experiments a woman's urethra; inoculation made with a pure culture of gonococci of the twentieth generation gave rise to a most characteristic virulent gonorrhœa. Gonococci are thus, therefore, undoubtedly the pathogenic micro-organisms of gonorrhœa. They are endowed with special properties in the presence of the urethral mucous membrane and the conjunctiva. Thus, gonorrhœa can never be produced by venereal excesses, after contact with menstrual blood, with non-specific discharges, etc., and must be considered distinct from all non-specific forms of urethritis. We now know that inoculation of the urethral or conjunctival secretions, rich in all kinds of micro-organisms, but not containing gonococci, is quite incapable of producing genuine gonorrhœa (*Zweifel*, *Welander*); the negative results obtained by the inoculation of "pure culture of gonococci" (*Sternberg*), can only be explained by technical errors, or by the use of cultures not containing gonococci. If *Drysdale* and others maintain at the present time that *gonorrhœa is probably not a specific inflammation*, this assertion still shows decided retrogression, both scientific and practical. Gonorrhœa has nothing to do with syphilitic chancre, and if it complicates syphilis it arises from the fact that the two conditions existed together in the same woman. Duality of the syphilitic virus with gonorrhœa, recently admitted by *Drysdale* and *Lee*, does not exist.

Gonorrhœa in man is quite distinct from the so-called gonorrhœa of dogs, which is non-infectious balanitis, the secretions of which do not contain gonococci. It is as incorrect to incriminate the dog as the cause of infection as to admit other well-known assertions, according to which the disease is said to be produced by alcoholic excesses, physical over-exertion, cold drinks, or micturating against the wind. Infection through water-closets used by patients suffering from gonorrhœa, as well as through soiling the hands with the virus, is *possible*, but very improbable, taking into consideration the great susceptibility of the gonococcus to sudden variations of temperature and to the drying up of its nutrient medium. In spite of a fairly large experience, we have not yet seen a single case decidedly originating in such a way. Gonorrhœa may therefore be considered as a local infectious disease, produced by the migration of gonococci. *Bumm's* minute researches on gonorrhœal conjunctivitis show that the gonococci penetrate into the cement substance between the epithelial cells (not so much into the cells themselves), and by proliferation traverse the epithelial layer as far as the papillary body. This leads to migration of leucocytes, which pass through, and, reaching the surface of the mucous membrane, absorb the specific microbes. The further proliferation of the latter limits itself to the more superficial layers of the subepithelial tissue, while at the same time the infiltration of round cells increases. The course of the infection renders the mechanism of gonorrhœal infection comprehensible. Before the gonococcus was known, it was admitted, in order to explain the mechanism of the disease, that the urethra, closed by the two lips which limit the urethral orifice, opened during coitus. The property possessed by gonococci of penetrating into the protoplasm of living cells, and especially into leucocytes, and of destroying them, distinguishes them from other non-specific diplococci, and constitutes a valuable diagnostic criterion. *Bumm* goes too far in stating all aggregations of diplococci found round the nuclei of leucocytes (never *in* the nuclei, as *Bockhart* asserts), enclosed in a mucous secretion, to be gonococci. We shall have occasion to refer to this view later on.

The infectious quality of gonorrhœa already exists in the premonitory symptoms at a period when abnormal secretions are not remarkable. Chronic forms of several years' duration are also infectious. It is sufficient to observe that *Neisser*, *Welander*, *Lundström*, and others, have found gonococci in these cases. In general, it may be allowed that disproportion of the genital parts (small vagina, large penis), with prolonged and frequent cohabitation, increases the chances of infection, while the reverse disproportion (large vagina, small penis) and emission of urine directly after coition (an emission which to a certain extent washes away the virulent secretion), lessens the probability of infection. It

may be considered as a fact that gonococci develop less plentifully the greater the reaction of the secretion, in spite of the contrary opinions of *Martineau* and *Castellan (De Sinéty, Henneguy, Aubert, Barduzzi)*.

The alkaline secretion of the urethral glands, while neutralizing the acid reaction of the soil, probably increases the susceptibility to invasion of gonococci (*Finger* and others). But the influence of an increased or decreased *individual predisposition*—after a great experience the most conscientious observers are forced to admit the existence of such—is often contrary to this rule. We know of an undoubted case where two young men had connection at the interval of one hour with a prostitute who was suffering from gonorrhœa; one, directly after coition, took all the kinds of prophylactic measures, and was nevertheless attacked by gonorrhœa; the other, who took none, did not suffer.

A previous gonorrhœa considerably increases the chances of fresh infection.

Chronic gonorrhœa originates from the acute forms; in many, but not in all cases, this sequela is favoured by neglect, excesses of all kinds, weakness of constitution, scrofula, and tuberculosis.

The frequency of gonorrhœa in men is incalculable; but of eighty-four non-selected patients belonging to the upper classes, *Leubuscher* found traces of the disease in fifty-one. *Nöggerath* declares that 80 per cent. of unmarried men have been infected with it, but our experience does not confirm this large percentage, although we have had an opportunity of looking for this infection in thousands of individuals of all social positions. *Winslow* recently observed a regular epidemic of gonorrhœa, and also of the rectal form, in a boys' school where pæderastia was much practised. Although the existence of rectal gonorrhœa is actually proved, the transmission of the disease by coitus *ab ore* is still uncertain.

Pathological Anatomy.—Apart from the presence of gonococci in the affected tissue, catarrh of the mucous membrane of the urethra presents nothing characteristic. Here, as in pyelitis and cystitis, we find hyperæmia, swelling, exudation; a urethritis granulosa, nodosa, follicularis exists. The primary seat of gonorrhœa in the male is the fossa navicularis; thence the disease progresses gradually backwards by direct extension, and in the course of the third week usually reaches the membranous part of the urethra. The opinion that the region of the compressor urethræ is not attacked by the gonococci seems to us rather improbable (see "Symptoms"). The glands and the follicles are most frequently attacked with inflammation, and are tumefied; the orifices of their ducts are obstructed by retention of the secretion, and even cystic changes may occur (*Guérin*). Genuine loss of substance is only met with in the chronic form. Sinuous and jagged gonorrhœal abscesses, on the

whole rare and mostly situated in the posterior part of the urethra, usually result from confluent follicular ulcerations, and may attain a length of 1 to 2 centimetres; they are covered with granular excrescences, and occupy the whole circumference of the urethra like a ring (*Zeissl*).

In *chronic* forms the gonococci become less and less in number. The essential part of the morbid process is considerable inflammatory hyperplasia of the connective tissue of the mucous membrane, particularly of that of the posterior portion of the urethra, and also a similar hyperplasia of the epithelium. This latter is often apparent as a quantity of superimposed layers of cells. In a case observed by *Vajda*, the epithelial portion was from four to twelve times as thick as in the normal condition; the cells were flattened, and the usual cylindrical shape had disappeared. This cell metamorphosis must, according to our numerous researches on the point, be considered as constant.

Cicatricial changes in chronic inflammation of the urethra are of great importance; their various origins have been recently studied post-mortem by *Neelsen*. Apart from scars originating from peri-urethral abscesses, that interesting cicatricial formation must specially be mentioned which arises from disseminated subepithelial infiltrations without ulceration, and which may be considered as a transition between cylindrical epithelium and horny pavement epithelium; the glands generally become atrophied after considerable dilatation of their ducts has sometimes taken place. A combination of the process of destruction of the glandular tissue, with cicatricial atrophy and inflammatory modifications of the epithelial stratum, may, as *Neelsen* justly observes, give rise to variations in the aspect of *living* mucous membrane, which allow of a differentiation of the different clinical forms of chronic gonorrhœa by means of the endoscope.

We will refer later on to the appearances of living gonorrhœic mucous membrane, recently so well described by *Oberlander*. It must suffice to state here, as *Auspitz* has shown, that from an anatomical point of view there are not sufficient reasons for considering chronic gonorrhœa as an *ensemble* of different independent forms.

SYMPTOMS—(1) *Acute Gonorrhœa.*—Virulent urethritis scarcely ever occurs without an *incubation period.* According to our own observations and the trustworthy histories given by patients, the average duration of this period is *four* days, which agrees with that of other authorities. Working men and agricultural labourers make the duration longer; nervous, frightened, and sensitive individuals often reduce it by half. In very exceptional cases, patients state that one day, or even only a few hours, intervened between infection and the appearance of the first symptoms; statements of this kind can only be explained by exacerbation of old latent forms. An incubation period of several weeks is nearly

always based on error, or mentioned with the intention of misleading the physician; and, as *Niemeyer* rightly remarks, the more the patients are ashamed of their disease, the more they are inclined to mention a remote date for its origin.

The *first* symptoms of gonorrhœa are usually of a subjective nature: frequent erotic excitement, a great tendency to erection and to emission, but especially itching and tickling at the meatus and top of the penis. On looking for the cause of these sensations, the patient will find between the red, tumefied and adhering lips of the meatus a small quantity of light-coloured mucus.

The sensations of tickling and itching soon become painful; the region round the meatus becomes more and more swollen and congested; micturition is accompanied by intolerable burning; the urethra becomes tender to touch; the swelling of the urethra shows itself by a small, interrupted stream of urine; in very serious cases, retention of urine, necessitating puncture of the bladder (*J. Hill*) may result. This complete retention of urine, which sometimes occurs suddenly, sometimes gradually, after excesses or an irrational mode of life (usually after long walks), appears to us to be due to a stricture, complicated with spasm and inflammation of the urethra. *Mauriac*, in attributing this spasmodic gonorrhœa to a reflex tetanus of the urethral muscles, seems to us to under-estimate the inflammatory swelling of the mucous membrane, a swelling which is in some cases the sole cause, the catheter passing without difficulty into the bladder.

On an average, after two days the *serous* discharge becomes *purulent*, and issues from the urethra in greenish-yellow drops, sometimes discoloured by blood and stiffening the linen; the *initial, mucous* stage has made way for the *gonorrhœal* one. The subjective disturbances, already mentioned, last for a week, and become sometimes more intense. The sleepless nights are often interrupted by painful emissions and erections, the penis and glans being bent downwards. The inflamed and infiltrated urethra is distended by the corpus spongiosum, and the corpora cavernosa cannot follow the distension of the latter, perhaps on account of spasm of the longitudinal muscular fibres of the urethra ("chorda venerea spasmodica"). Of course the general health suffers; the patient is often attacked by slight fever, by dyspepsia, and suffers from constipation, rendering defæcation exceedingly painful. Thus, many cases brought into our ward as "gastric fever" turn out to be simple gonorrhœa. Only certain individuals are able to bear intense inflammation without inconvenience.

Usually, during the gonorrhœal stage a remission of all the symptoms occurs, especially at night; the flow of purulent discharge lasts for a week (the gonorrhœal period lasts in all a fortnight), and becomes gradually mucoid and less and less abundant; this is the *terminal stage*. In benign cases the cure is complete at the end of six or eight weeks, or the acute

gonorrhœa may become chronic. Duration of only four weeks is exceptional.

In certain cases rupture of the vessels of the inflamed urethral mucous membrane may be observed; the discharge varies from a *hæmorrhagic* to dark-brown colour. This discharge, wrongly so much feared, is the origin of the name of the "black" or "Russian" gonorrhœa. Infiltrations of the *peri-urethral* connective tissue, usually seated on either side of the frænum and in the region of the peno-scrotal angle (*Watermann*), are less harmless. They are probably due to the lymphatic vessels, and make their appearance in those regions not abounding in bloodvessels (*Ehrmann*). The danger of these infiltrations lies in the possibility of formation of abscesses, but principally in the propagation of the inflammation towards the corpus cavernosum, the formation of urethral fistula (*Horand* has always seen them seated in front of the bulbus in the acute form), or circumscribed cicatricial indurations with *destruction of the cavernous tissue.* Such an event produces angular incurvation of the penis during erection, the cicatricial tissue no longer being able to be distended with blood. During the acute inflammatory stage of these infiltrations of the corpora cavernosa the erections are exceedingly painful ("chorda venerea inflammatoria"). The process sometimes develops in a very insidious manner. We know of several young men who became permanently incapable of cohabitation in consequence of the almost rectangular incurvation of the penis towards the left during erection, without precedent marked disturbance (see section "Impotence").

Acute gonorrhœa is frequently complicated by *lymphangitis* of the penis. It manifests itself in the form of hard, painful cords situated on the dorsum of the penis, and is accompanied by swelling and a remarkable redness of the adjacent parts and of the prepuce. This lymphangitis, like the corresponding *lymph-adenitis,* is rarely the forerunner of abscesses. In scrofulous, tuberculous, enfeebled individuals, the former may sometimes lead to *buboes,* which are difficult to cure. In a case under our observation an otherwise healthy young man died from suppuration of such buboes.

Finally, we must mention inflammatory and œdematous swelling of the *prepuce,* a condition entirely independent of lymphangitis, and due to the prolonged contact with gonorrhœal pus. The same cause also produces in certain cases inflammatory *phimosis,* balanitis, or *paraphimosis.*

Microscopical examination of the *discharge* in the initial and mucous stage shows the presence of numerous round epithelial cells in the midst of a finely striated mucous stroma. On careful examination of the preparations, under the smooth transitional epithelium, *hyaline, homogeneous* cells with an indistinct or invisible nucleus are found. We designate these

hyaline cells by the name of *iodophile epithelia* in consequence of their peculiarity in turning brown on application of a very weak solution of iodine (Fig. 7). Contrary to the opinion of many authors, they are not pathological, and are not absolutely characteristic of chronic gonorrhœa, but constitute a normal physiological phenomenon. During the gonorrhœal stage the discharge presents under the microscope all the characteristics of ordinary pus. In a few exceptional cases we have found concentric stratified amyloid corpuscles in fairly large numbers without the process being complicated with prostatitis (*cf.* the section devoted to the latter subject).

But what especially characterizes the discharge is the presence of *gonococci*, which are in a few minutes recognisable by staining with aniline. This coloration is obtained with all kinds of staining reagents—gentian violet, methylene blue, fuchsine, safranine, etc. We have always preferred a solution of fuchsine, which acts rapidly; solutions of aniline and phenic acid, useful for staining of tuberculous bacilli, also act very rapidly, and do not produce, as *Bumm* also observes, even in strongly concentrated solutions, excessive coloration. After having placed a drop of discharge on a cover-glass, and dried it by passing it through the flame of a spirit-lamp, a drop of filtered solution of fuchsine is dropped on the surface, and removed after about a minute's time by a plentiful use of water; the non-occupied side of the cover-glass is dried with blotting-paper. When magnified about 300-fold, the gonococci and the nuclei of the cells are seen to be stained intensely red, the colour of the former being more pronounced. The characteristic grouping is well seen in Fig. 7. The gonococci never form chains. The diplococcus form, recognisable in large groups, is the result of alternate division, according to the horizontal or vertical plane. The constant size of the micro-organisms is of some diagnostic value (average length, according to *Bumm*, 1·25 μ). But what really distinguishes the gonococcus from other diplococci is its property of penetrating the protoplasm of living cells, of multiplying there and destroying them. They are found especially in the *interior of the leucocytes*, but outside of their nuclei. Free circular aggregations of gonococci often suggest previous destruction of a cell. The marked way in which gonococci preserve the staining when compared with the decoloration of the nuclei and of the cellular protoplasm when treated by alcohol (*Eschbaum*) or acetic acid (*Schütz*), and the contrast formed by the diffusion of the staining reagent, allows of even beginners recognising the distinct characters of the microscopic preparation. Finally, it is worth noticing that gonococci may be *discoloured* (*Roux*, *Wendt*) by *Gram's* method, and this is an excellent criterion of the value of the conclusions drawn from this method by the initiated. The double staining of preparations treated by *Gram's* method has given us facts which

permit the differentiation of gonococci from other micro-organisms. (For details see section on "Diagnosis.")

Usually the number of cocci diminishes with the duration of the gonorrhœa (see "Chronic Gonorrhœa"). During the inflammatory stage other bacteria and fungi are rarely found with gonococci in the *male* (*Eklund, Aubert*). *Sébastian* described five kinds of such micro-organisms.

The *urine* in acute gonorrhœa has characteristic properties. During the initial and terminal mucous stages, it contains the catarrhal products in the shape of flakes and mucous filaments;

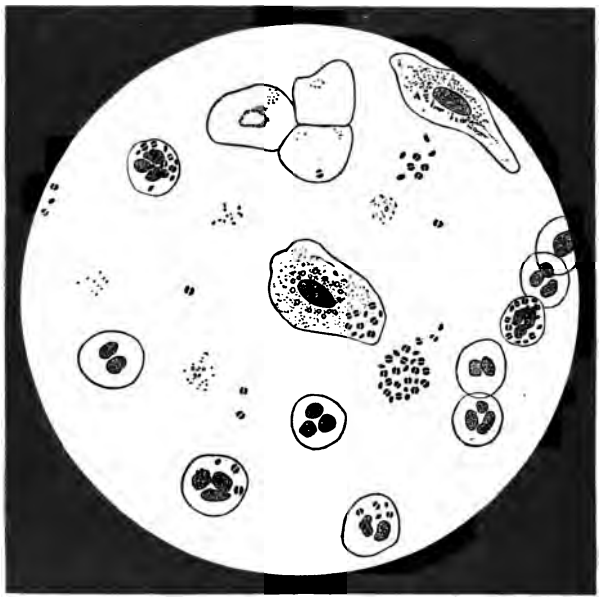

FIG. 7.—URETHRAL DISCHARGE IN ACUTE GONORRHŒA (ROUND CELLS, PARTLY "IODOPHILE" URETHRAL EPITHELIA, GONOCOCCI). ANILINE COLORATION. MAGNIFIED 600-FOLD.

during the intermediate gonorrhœal stage genuine pyuria exists, seldom so pronounced, however, as to show large quantities of albumin after filtering. Morphological elements are expelled with the first few drops of urine, and the remainder is quite *clear*, provided the bladder is not at the same time affected with catarrh.

In a certain number of cases of acute gonorrhœa, the patients complain of frequent and urgent *desire* to micturate, as in cystitis. In these cases the *last* portion of the urine passed is as hazy as the first, and contains pus. Experienced observers are

agreed on these points. The significance of this phenomenon, which has led to divided opinions, and the importance of which has been much exaggerated from both the clinical and practical point of view, varies. A few years ago it was admitted that the frequent micturitions, and the fact of the urine containing pus in the course of gonorrhœa, were due to the inflammation spreading from the urethra to the bladder or to the neck of the bladder. The French school, *Guyon* (1883) and his followers, *Jamin*, *Aubert*, and *Picard*, have put forward another theory, according to which acute gonorrhœa in its typical form remains limited to the anterior part of the urethra, separated from the posterior part by the "urethral sphincter," situated in the front part of the membranous portion, etc., and containing striated circular muscular fibres. This omnipotent sphincter externus, in favour of which the bladder itself has been deprived of its own sphincter, and which is known by the name of *Wilson's* muscle, is situated between the two layers of the deep perinæal fasciæ between the ramus ischiopubicis and, together with *Müller's* constrictor isthmi urethræ, is able to close the urethra as a clamp closes a rubber tube. When the inflammation passes beyond this, a complication characterized by two new symptoms, strangury and purulent urine, is met with. In these cases not only do mucous pus and blood regurgitate into the bladder out of the posterior part, but even the liquid injected into the posterior part takes the same course at the moment when the catheter is removed. This theory has been adopted in Germany—even by authorities like *Ultzmann* and *Finger*—with an enthusiasm capable of convincing the most incredulous. We regret, however, we are not able to admit this theory, based on insufficiently convincing experiments. We still, as we already said in 1884 (1st edition), decline to accept this division of gonorrhœa into "anterior" and "posterior" urethritis, and believe that in the majority of cases tenesmus is caused by the inflammation spreading beyond the meatus as far as the bladder, and that the fresh symptoms are due to a commencing cystitis. Apart from clinical and experimental observations made by *Dittel*, *Stricker*, and *Harrison*, which give a sufficient explanation of the remarkable resistance of the internal sphincter of the bladder, our personal experience has enabled us to arrive at the following conclusions. In chronic inflammation of the prostatic portion of the urethra, the gonorrhœal filaments are contained in the first drops of urine, and not in the chief contents of the bladder; prostatorrhœa and spermatorrhœa are manifested without accompanying erection, as genuine urethral discharge; a more or less continuous spermatorrhœa exists which does not conduct spermatozoa into the bladder, the secretion of the prostatic gland appears on pressure of the rectum like a urethral discharge; it cannot be admitted that the gonococci may be arrested in their course by the compressor muscle, the mucous membrane before

and behind this muscle presenting the same characteristics; the propagation of the gonorrhœal process to the spermatic tract (spermatic cystitis, epididymitis) does not of itself cause strangury. To these propositions we may add *Zeissl's* reasons: clearness of the second portion of urine in the case of epididymitis, discharge of blood when the prostatic portion is injured, the possibility of obtaining pus from the posterior portion of the urethra by means of a probe, in spite of the clear contents of the bladder. The experimental injections made by *Diday* and *Jamin* are by no means conclusive, and require confirmation. *Casper's* two latest experiments are not more decisive; the fact that ferrocyanide of potassium is found in the contents of the bladder after it has been introduced into the posterior portion of the urethra, and that its existence can be proved with the well-known reaction with iron, is by no means conclusive; pressure caused by instillation could easily force a small quantity of the solution into the bladder, capable of being discovered, thanks to the excessive sensibility of the reaction with ferric ferrocyanide. Finally, the presence of gonococci in the posterior part of the urethra cannot be considered a "proof" in favour of this theory.

We quite recognise the difficulties of determining the exact localization of gonorrhœa in the urethra, even with the aid of the endoscope, and we are convinced that the views we have just discussed can no more be relied upon than those put forward in favour of *Guyon's* theory. We agree, however, with *Leprévost*, *Zeissl*, *Mracek*, and others, that posterior urethritis does not lead to clouding of the urine contained in the bladder, and that this can only take place when paralysis of the sphincter of the bladder is present, so that if the second portion of urine contains pus, it must be considered to be of cystitic origin, a fact which *Guyon* opposes less than one would expect, after what has been said by his followers. *Lesser*, also, now admits that in posterior urethritis the second portion of urine may be clear, a phenomenon which he explains by the fact that the pus has "not yet" entered the bladder. As we have already remarked, the *non liquet* with which we bring this discussion to a conclusion has much less importance, from a clinical and practical point of view, than appears to the uninitiated, from the propaganda made in favour of the theory by the French school.

2. *Chronic Gonorrhœa* (*Goutte Militaire*). — The transitional forms between acute and chronic and genuine subacute gonorrhœa are many, and in the majority of cases the imagination of the physician alone decides the moment when the affection has passed into the chronic state. If the terminal mucous stage of acute gonorrhœa lasts more than three months, we do not hesitate to speak of chronic gonorrhœa, all the more as in these conditions the affection itself may still last several months.

We adopt *Finger's* definition generally. He looks upon chronic gonorrhœa as a persistent terminal stage, and the localization of the process in a circumscribed portion of the urethra, by preference in the bulbous, membranous, or prostatic portions, the other parts of the mucous membrane having returned to their normal condition. Our personal experience does not allow our admitting an absolute distinction between chronic urethritis of the various portions of the urethra. The symptoms corresponding to these different divisions are so slightly connected with the localization of the process, as shown endoscopically, that their clinical importance may be considered as nil. We especially warn our readers against differential diagnosis made by means of the "sonde exploratrice" of French authors (a probe extracting the pus or mucous discharge from the various depths of the urethra), or by the localization of the pain during passage of the "sonde." Thus, individual susceptibility may have a great influence on the results of exploration. With, relatively speaking, the same localization, proved by endoscopic examination, we have seen patients suffering from the most varied disturbances, while, on the other hand, circumscribed urethritis of the penile portion, or of the posterior part of the urethra, gives rise to no subjective symptoms whatever. Even admitting that chronic urethritis of the bulbous portion is the most frequent localization (*Guyon*), we believe that in all forms of a somewhat relapsing character the inflammatory process extends, almost without exception, to a more or less extensive portion of the posterior part of the urethra—in other words, that the *mixed forms* of this category, with their varied combinations, have no absolute anatomical basis. But in cases where frequent strangury exists, cloudiness is found in the last portion of the urine passed, as a remittent or intermittent symptom. We are obliged to admit, on the strength of what we have already said, that the process has passed the prostatic portion, and has penetrated into the region of the orificium internum, *i.e.*, the portion of the bladder itself.

We do not recognise any other chronic gonorrhœa than that resulting from the acute form. Amongst the causes favouring this transition we include neglect of treatment (insufficient treatment), all kinds of excesses, results of occupation, frequent reinfections, constitutional disease of various kinds (especially phthisis), and rough local treatment, especially the abuse of injections (*Guyon, Aubert, Brou*). Nevertheless, there are cases which, in spite of the existence of all these injurious factors, get quite well, and others which, notwithstanding scrupulous attention and proper treatment, become chronic.

In the majority of cases of chronic gonorrhœa the pains have ceased, and only some patients continue to complain of tickling, itching, and burning in the anterior and posterior parts of the urethra. Nearly all patients complain of feeling in the region of

the perinæum an indefinable painful sensation, which reminds them that things are not as they should be. In some cases, which according to our experience are not very rare, one observes decided painful symptoms, radiating towards the testes and the anus, dysuria (irritable bladder), painful emissions—in short, the most varied disturbances of the genito-urinary sphere; furthermore, disturbances in the lumbar region, the back and extremities, peculiar to the so-called spinal irritation, and even general nervousness of an intense degree, without any complication of chronic gonorrhœa being apparent. In the chapter on "Spermatorrhœa" we give a detailed description of the symptoms of this *neurasthenic* condition. We will only remark that the appearance of different forms of various general disturbances, known under the name of "gonorrhœal neurasthenia," is allied to an acquired or hereditary individual nervous disposition. But we do not think, as *Miesiewicz* admits, that chronic gonorrhœa can prepare the way by reflex action for vesical paralysis, albuminuria, polyuria, and even tumour of the spleen. In a third series of cases, no definite objective sign was found; the affection takes its course in a latent manner (*Guiard's* "urethritis latens"). In a small minority of these patients (according to our personal observations 18 per cent.), latent and manifest spermatorrhœa occurs, which, as we shall show later on, is in no way associated with neurasthenia (*cf.* "Spermatorrhœa").

The *discharge*, mucous and cloudy or muco-purulent, in *small quantities* sometimes passes unperceived, sometimes shows itself early in the morning in the form of a drop ("Morgentropfen," "goutte") which the patient perceives by pressing the urethra, and which in drying closes up the lips of the meatus. At times, usually after excesses in baccho et venere, after a copious repast, or following intense cold or physical over-exertion, sometimes also without any apparent cause, relapses take place and chronic gonorrhœa becomes acute. In these cases inexperienced physicians usually declare that a new infection has been incurred even when the patient insists upon a previous gonorrhœa. The status quo is generally re-established after some days, sometimes even there is improvement, which may, however, be the effect of the contrast. In this manner the malady continues for years without the least complication, the course of the affection is only interrupted by apparent remissions and relapses, which some bear with a really surprising nonchalance, others with genuine despair. In other cases, strictures, cystitis, and more or less serious complications, occur without any obvious reason.

Intelligent and observant patients perceive that chronic gonorrhœa has led to an alteration in their *urine* which, after the cessation of the inflammatory stage, has not disappeared. The urine contains *stringy formations* which are expelled with the first flow, and which greatly astonish the inexperienced physician,

while the patients rightly consider them a symptom of chronic gonorrhœa, a symptom which becomes for them a new source of anguish and despair.

The various and usually false ideas which exist on the composition and diagnostic value of these "*gonorrhœal filaments*," which some consider as a characteristic symptom of an affection of the prostate, some as the sign of improvement, oblige us to mention here the results of our own researches, published some years ago, on the nature, origin, and clinical significance of "urethral filaments." Under this general designation are included all the pathological products of the urethra and the corresponding glands, products which under the form of filaments and macroscopic flocculi are expelled by the act of micturition. The definition of "gonorrhœal filaments" is only so far justified that gonorrhœa is the chief cause.

The *macroscopic* aspect of these filaments is very variable. In ordinary cases there are two types—muco-gelatinous products, varying in size from a hair to a knitting-needle, in length from some millimetres to a centimetre, usually twisted, rarely offering a bulbous extremity (*Ultzmann*), which, when drawn from the urine by the aid of a needle and placed on a cover-glass, contract and form fine curves. The second type consists of short filaments and flocculi of an opaque, yellow colour, of a non-retractile nature, and with a decided tendency to disappear on shaking up the urine. It is evident that transitional forms belonging to these two types are very numerous. More rarely we find products solid in consistency and of fairly considerable dimensions. These occupy a special place, and will be mentioned with the croupous form of gonorrhœa further on.*

On examination under the microscope we notice that the principal components of the urethral filaments are round and epithelial cells (Fig. 8), held together by a muco-gelatinous substance. Besides these, spermatozoa, red blood corpuscles, various cellular bodies, crystals, micro-organisms (amongst which gonococci claim the greatest interest), and foreign bodies are often found.

* *Gabriel* had the opportunity of examining 100 patients in *Lassar's* Clinic who suffered from gonorrhœal filaments, termed by *Fürbringer* "filamenta urethralia," and always found them to be a sign of urethritic irritation or characteristic gonorrhœa. He distinguishes two forms: In one the stroma contains only round cells, in the other epithelia also. In the former case the filaments correspond to acute, in the latter to chronic, gonorrhœa; but then the proportion of round and epithelial cells is very variable. Even if external influences, such as previous cohabitation, play a part, still, in general a preponderance of round cells coincides with increased activity of the inflammatory process in the urethra. At the same time, gonococci were only found in cases of acute gonorrhœa—the more recent the infection, the greater the quantity. If these micro-organisms were found in chronic gonorrhœa, then, according to *Gabriel*, reinfection exists, as, according to *Lassar* and other authors, such a recrudescence of chronic gonorrhœa never occurs.—W. H. G.

The *round cells* give the filaments the yellow cloudy appearance, and give rise to a resemblance to plugs of pus. They have no special clinical significance, and are only the result of a catarrh with a tendency to pus formation.

The *epithelial cells* met with in these cases are of various shapes, and may be divided into three groups: *flattened cells* are most frequently met with, and merely indicate a desquamation of the superficial layer of the urethral epithelium; *transitional epithelial cells* (round, oval, polygonal, fusiform, cylindrical, caudate); and lastly, the typical *cylindrical epithelial.* The

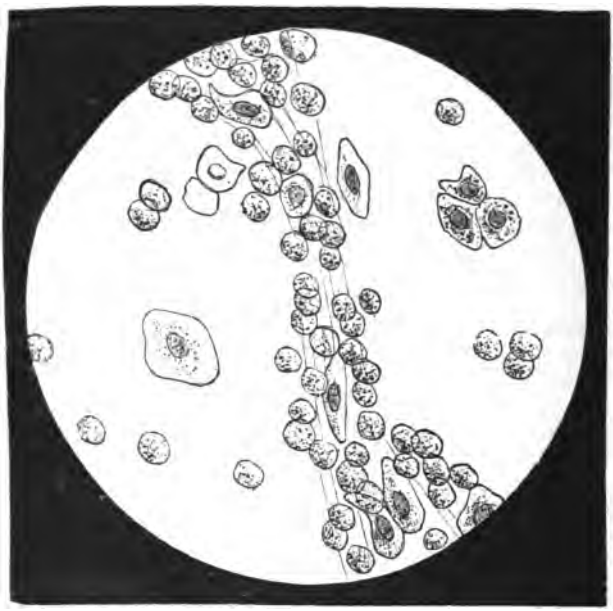

FIG. 8.—URINARY SEDIMENT IN CHRONIC GONORRHŒA (IN THE CENTRE A GONORRHŒAL FILAMENT).

latter, often mistaken for round cells, and supposed to be a permanent constituent of them, are seldom met with, according to our personal experience, in the filaments of *non-complicated* chronic gonorrhœa, a fact explained by the metamorphosis in cases of chronic inflammation of cylindrical into flattened epithelium (*Englisch, von Vajda, Neelsen*).

We have already referred to *hyaline epithelial* cells, and of their unimportance with regard to the gonorrhœal process. The frequency of fatty epithelial cells in the interior of the filaments is equally greatly exaggerated.

The genesis of the urethral filaments, the basis of which is mucin, is tolerably clear. *Urethral filaments are formed everywhere, where in cases of catarrh of the urethra, in the widest sense of the term, a sufficient quantity of mucin is produced to hold together the cellular elements of the exudation.*

This fully explains why we consider urethral filaments as a symptom of the initial, terminal, and mucous stages of acute gonorrhœa.

In *chronic gonorrhœa* these filaments form a clinical objective symptom, as they are identical to morning "drop" squeezed from the meatus, to the viscous secretion which, in spite of every effort, accumulates every day for years between the lips of the urethral orifice.

Urethral filaments are a more constant accompaniment of gleet than the morning drop which forms at the meatus. This latter may, in consequence of scantiness of discharge or in consequence of obstruction to its passage from the posterior parts of the urethra (the genuine source of its formation), escape the notice of the physician as well as of the patient; the filaments, however, are always found in the urine, a sure symptom of the morbid condition of the urethra. The patient is often quite disconcerted when, on finding the characteristic filaments, they remind him of the little accident of former years which has entirely escaped his memory. *Zeissl* rightly declares that, when filaments are found in the urine, the process about to subside may be started again by the slightest indiscretion.

For years we have considered urethral filaments as the most positive and most delicate proof whether the patient is completely cured or not. Sometimes the presence of these filaments does not necessarily affect the non-infectious character of the affection; it may present itself in this manner in the latent condition for years without affecting the health of the patient.

Independently of the factor produced by intense suppuration, filaments are seldom found during the period when latent gonorrhœa exists (apart from the time during which astringent drugs act in the intermediate stage). During that period, sediment of pus, instead of morphological elements, is found.

For details concerning the presence of urethral filaments in the course of non-virulent *urethritis* and *prostatitis* we refer our readers to the sections on those subjects.

In some rare cases the gonorrhœal process is indicated by small fistulous channels in the cul-de-sac of the anterior urethra (*Diday, Otis, Jamin*), from which small drops of pus may be squeezed. It is important to know, from a practical point of view, the fact, proved by French and Swedish authors, that such cul-de-sac ducts in the region of the prepuce, and especially those near the insertion of the frænum, may be infected by the gonorrhœal virus. We are thus brought face to face with a form

in bringing under notice in a remarkable manner the pathogenesis of the important complications of gonorrhœa, especially as regards the formation of stricture, and of indicating prophylaxis and treatment of this latter complication. We shall devote a section later on to the nature of already-formed *strictures*. At present we must be content with saying that, according to classical theories, organic stricture results from the propagation of chronic inflammation to the submucosa and to the deeper tissues, or to the cicatricial healing of the same. In these forms stricture has a tendency to become more and more marked. In other cases, where chronic inflammation of the urethra has only diminished the contractibility of the urethral walls, which by becoming rigid contract the lumen, the form of the affection, named by *Otis* "large stricture," is less intense, more supple, and more flexible. Its importance as a basis for chronic urethral discharges is much exaggerated by American authors. In such cases *Oberländer's* investigations are certainly an advance. We content ourselves with selecting from the mass of details in his work the chief types.

From a pathologico-anatomical point of view, *Oberländer* distinguishes two principal groups: (1) *mucous catarrh*, which, either as an exudative hypertrophy, accompanied by inflammatory, velvety swelling of the mucous membrane, or under the dry form, produces types similar to the constricting processes; (2) *glandular urethritis*, which mainly attacks the glands of the mucous membrane. This latter group includes four forms: (*a*) *Urethritis glandularis circumscripta*, when small, circumscribed, inflammatory centres are formed; (*b*) *urethritis glandularis proliferans*, when the process extends more uniformly in a more diffuse manner, with proliferation of epithelium and formation of a smooth cicatrix; (*c*) *urethritis glandularis hypertrophica*, transforming the urethra into a rigid canal; (*d*) *urethritis glandularis stringens*, the inflammatory process forming granular islands, which by cicatrization are capable of producing extensive strictures. *Oberländer* adds to these forms *urethritis follicularis*, which is accompanied by obstruction of the secretory ducts of the glands, and he finally classifies between the two principal groups the rare form *urethritis granulosa falciformis*, which in the course of a year may cause contraction of the urethra to half its natural circumference. We refer to what has been said by *Neelsen* (p. 160) regarding the pathological histology of these forms.

Oberländer has also carefully studied the formation of papillomata in the urethra in the male, and found that this condition is dependent on hypertrophic catarrh. The forms met with correspond in general to those of condylomata acuminata on the exterior of the penis; they may be described as crested, tufted, raspberry- and cauliflower-shaped, and have a predilection for the

middle part of the pars pendula, causing, however, special disturbances only when of some size. The participation of the veru montanum leads to obstinate nocturnal emissions and even —though we do not agree with this—to impotence. In one case obliteration caused aspermatism. If the neoplasm develops about the internal orifice of the urethra, the painful symptoms of irritation of the bladder are always present.

The question as to how far methodical urethroscopy as practised by *Oberländer* may be of service in the clinical observation of gonorrhœa in general is still undecided, although treatment based on the endoscopic diagnosis has certainly had very appreciable results (see "Treatment"). We have ourselves during the last few years examined with *Auspitz's* apparatus a considerable number of persons suffering from gonorrhœa, but we must honestly admit that in the majority of cases this method of exploration (which we do not consider as entirely harmless even in experienced and able hands) has been of little use in the diagnosis and local treatment. Our desire that urethroscopy, with its complicated and difficult technique, should come into general practice is certainly not great, as a considerable number of persons have come under our notice who have suffered from these diagnostic manipulations. Of course, we do not mention really serious complications or accidents, such as tears and hæmorrhage of the mucous membrane, in consequence of the sudden closing of the two valves of the speculum; aggravation of the inflammatory process, with unbearable pain, by injury of the affected mucous membrane; epididymitis and cystitis after exploration, etc.—facts which appear to indicate culpable negligence on the part of the physician.

For many years we have only used the endoscope in cases where the treatment or clinical observation led us to suppose that abnormal phenomena existed, not belonging to the classical types, and which could only be discovered by direct inspection. In such cases we have found rare complications, such as papillomatous growths, ulcerations, chancre, etc. Our opinion is shared by *Tarnowsky* and *Finger*, who only use the endoscope after having accustomed the patients to ordinary catheterism. It is therefore preferable that *methodical* endoscopy should remain in the hands of specialists who have had time and opportunity to learn the management of the instrument. That the conscientious physician only decides with difficulty to use the endoscope is in our opinion a great advantage for the patient, who certainly finds but little profit by exposing his inflamed urethra or his affected bladder to the endoscopic manipulations and experiments made by inexperienced practitioners. These considerations do not affect the importance of the facts proved by the researches of the specialists. It is at present impossible to classify the instruments in use, according to their special and general value with regard to the

simplicity of their technique and the true definition of what is offered to view, as each inventor has only words of praise for his own instrument. On account of excellent reflection, however, *Oberländer's* apparatus is certainly superior to the others.

Gonorrhœal inflammation rarely prepares the way for the *croupous process*. This latter is clinically manifested by very pronounced dysuric conditions, which disappear after the expulsion of the obstructing discharge in the forms of cylindrical membranes, the fibrinous nature of which has been proved by *Zeissl*, by the aid of acetic acid. Injections of solutions of perchloride of mercury were said to cause this phenomenon. In two cases observed by us, this occurred after injections with *Ricord's* ordinary lead emulsions. The patient, whose inflamed urethral mucous membrane was probably especially sensitive, passed, with symptoms of tenesmus and intolerable pains, a white, stout cord, 10 centimetres in length by 2 to 3 millimetres in diameter, containing a considerable quantity of crystals of sulphate of lead. In another case, under the influence of an injection of a strong solution of perchloride of iron, the patient ejected a stratified membrane composed of epithelial cells, held together by a fibrinous substance. The gonorrhœal process was not modified in this case.

It has long been proved that chronic gonorrhœa may certainly be infectious. We know actually that transmission is possible when the affection has been going on for years, a fact which family physicians are but too well aware of. At the same time, the infection is not the rule, and it depends on the presence of gonococci in the gonorrhœal discharge. In reality it is not very uncommon to meet with them in chronic forms, in the discharge and in the filaments, only in these cases the gonococci are not numerous, and one must carefully look for them, and make several preparations before finding any. In chronic forms long under treatment, the frequent presence of numerous other bacteria makes the discovery of gonococci difficult. According to our experience, the aggravation of gleet into gonorrhœa is not due to the presence of a great number of gonococci. We have, however, seen them as numerous in acute gonorrhœa. We admit with *Neisser* that gonococci are still to be found in more than half the cases where chronic gonorrhœa has existed for several years. In cases where, in spite of most conscientious search, gonococci are not to be found, inflammation, originating in the gonorrhœal infection itself, has become *independent*, and the aforementioned anatomical changes, such as granular catarrh, inflammatory hyperplasia of the urethral walls, *in toto* maintain the exudation process. We do not consider these forms to be infectious, and we cannot feel justified in prohibiting marriage. However, as the presence of gonococci is subject to innumerable variations, a definite opinion as to their presence or absence is impossible (see "Diagnosis").

Amongst the important *complications* of gonorrhœa, we must consider *urethral strictures*, extension of inflammation to the *bladder*, to the *kidneys*, to *Cowper's glands*, to the *prostate*, to the *spermatic duct and genital glands*, *spermatorrhœa*, *condylomata acuminata*, *gonorrhœal arthritis*, *ophthalmia*, *and gonorrhœa of the rectum*. The three latter complications belong to affections of the eye and the intestines. Cystitis and pyelitis have already been described; other complications will be discussed later on. We have not observed the extension of gonorrhœa on the skin in form of erethism and herpetic eruptions, as described by *Audret*.

DIAGNOSIS.—The diagnosis of *acute gonorrhœa* is nearly always easy. We should never have thought of the possibility of confusion with *balanitis* or even with *posthitis*, if such patients were not daily sent to us as gonorrhœal. If phimosis does not exist, it is sufficient to wipe the glans penis with wool, and to squeeze the penis to see if pus escapes from the meatus. If necessary, the inside of the prepuce must be syringed, and the patient made to urinate. In balanitis the first portions of urine are clear.

When a regular discharge does not exist, the morning urine is to be preferred for examination for gonorrhœal filaments. The longer the interval from the last micturition, the more evident the result of examination.

The course of the affection offers considerable value for differentiation from non-virulent acute catarrh. If the cause of the affection has disappeared, the catarrh ceases in one to two days. Regarding *Bockhart's* pseudo-gonorrhœa, we refer our readers to the section on "Non-Virulent Catarrh of the Urethra." The search for gonococci, which we consider to be of great importance, will decide in difficult cases. A microscopical examination is sufficient to show up falsehoods. In one of our cases conjugal infidelity was proved in a quarter of an hour *ad oculos*, and acknowledged by the culprit in the presence of the power of scientific demonstration. We have already mentioned the methods of proving the existence of gonococci, which ought nowadays to be in common use. It is exceedingly easy, and the examination can be made in a few minutes in the consulting-room, even during the consultation, talking all the time to the patient. Sometimes even the micro-organism can be found in the linen stains (*Allen*). The recent attempt to diminish the diagnostic importance of the presence of gonococci in the discharge does not appear to us to be justified. In accordance with *Neisser*, *Finger*, and *Oberländer*, it must be admitted that gonococci may disappear and reappear in the discharge in the most unaccountable manner. After being absent for a long time, they may suddenly reappear after an irritating injection, or after the dilatation of a stricture. Thus, the negative result of a frequent bacteriological examination of gonococci extended over a considerable length of time cannot always be a proof of the complete cessation of the

infectious process. We must consider as not justified—at any rate as not proved—the assertion that gonorrhœal infection does not exist in the gonococcus alone. The inconstant transmission of confirmed gonorrhœa cannot be brought forward in favour of this theory with more right than facultative transmissions of other infectious illnesses, which depend on specific micro-organisms as the sole agents of infection. The question of knowing whether the masses of diplococci in the interior of the cells are really gonococci (the practitioner has never time to occupy himself with cultivations) is of the greatest importance. Apart from the microscopic constitution of certain genital secretions found in the female, we must discuss two opinions. On the one hand, *Ogston, Councilman,* and *Von Zeissl* maintain that in secretions of an urethra irritated in a mechanical or clinical manner forms identical with gonococci are found; on the other hand, *Lustgarten* and *Mannaberg* declare that even the healthy urethra contains a quantity of various bacteria which can morphologically scarcely be distinguished from gonococci. Although we have ourselves never observed this, we should never think of denying the facts stated by these authors. Even admitting that in chronic gonorrhœa in the male gonococci are not always found, as the preparations cannot be numerous, or that the absence of such micro-organisms is proved by numerous preparations, we allow that in some quite isolated cases gonococci are to be found in a non-gonorrhœal secretion. These facts cannot be considered as an absolute proof of the non-infectiousness and of the non-virulence of *Neisser-Bumm's* gonococcus. One is no more authorized to consider these facts as in opposition to the theory of these two authors, or to speak of the search for gonococci as "lost time" (*Oberländer*), or even to declare as proved the impossibility of morphological diagnosis (*Schuurmans, Stekhoven*), than to deny the diagnostic importance of tubercle bacilli, because one has only met with them by chance once in urine. We do not even take the trouble of refuting *Stekhoven's* recent theory (who does not hesitate to deny the value of *Bumm's* inoculation), according to which in gonorrhœa the active part belongs not to gonococci, but to leucocytes.

If in cases of chronic gonorrhœa gonococci are not found in the secretions, or if only doubtful micro-organisms are seen, the proper thing to do is to follow *Neisser's* advice, and to inject perchloride of mercury. Gonococci multiply, while other micro-organisms succumb.

On the other hand, we warn our readers against the prejudiced tendency to make the diagnosis exclusively from the bacteriological examination. We willingly allow that *Oberländer's* "precise" types obtained by the endoscope play an important part. Regarding *Nöggerath's* ideas on the diagnosis of gonorrhœa in the female, see section on this subject.

Differentiation from urethral chancre is not always easy. Sometimes the hard chancre can be felt through the tissues, but it is important not to confuse the latter with the gonorrhœal infiltrations which have been already discussed. Reinoculation does not always give positive results. The appearance of secondary symptoms confirms the diagnosis of syphilitic chancre. In the majority of cases the immediate solution of the question is furnished by the urethroscope.

A confusion with catarrh of the bladder is avoided by testing the urine after dividing it in two parts. If the bladder be intact, the second portion of the urine, after the emission of 20 to 30 cubic centimetres, is found to be clear. When the contrary occurs, it is turbid. We do not allow distinct differentiation between anterior and posterior urethritis, for in the majority of cases of chronic gonorrhœa the process does not respect the barrier formed by the compressor muscle, and in such a case we find ourselves in the presence of mixed forms.

Jadassohn has proved the existence of posterior urethritis by syringing the anterior part of the urethra in cases where the examination of the two portions of urine give no results. This demonstration is in favour of *our* theory.

For details regarding differential diagnosis of gonorrhœa from stricture, urethrorrhœa *ex libidine*, prostatorrhœa, and spermatorrhœa, see sections on these conditions.*

Prognosis.—Our own large experience does not allow of our admitting the prognosis of gonorrhœa to be favourable. If in the majority of cases acute gonorrhœa is cured as such—we do not, however, agree with *Schwartz's* opinion of 85 to 90 per cent.—the number of cases in which chronic gonorrhœa follows the acute form is so considerable that the prognosis must in general be considered as doubtful.

The prognosis is notably influenced by the manner of life, the nature of the treatment, and especially by the individuality of the patient. It is often impossible to prevent acute gonorrhœa from becoming chronic, but, on the other hand, one sees gonorrhœa, accompanied by violent inflammatory phenomena, get well spontaneously. These cases are, however, exceptions, which cannot be relied upon, while good results are always expected with suitable treatment. The physician must be careful to insist on the patient being prudent from a prognostic point of view. "Une chaude pisse commence, le bon Dieu seul sait quand elle finira." Nothing has been able to change this phrase of *Ricord*,

* According to *Macintosh*, gonorrhœa is much more frequent in coloured than in white people, while the contrary is the case with regard to stricture. Out of 100 white patients in the hospital at New Orleans, only 5 had gonorrhœa; out of the same number of negroes, 70 had gonorrhœa. On the other hand, out of 100 white patients, 18 had stricture, while among the coloured patients only an average of 5 per cent. was obtained.—W. H. G.

which has become a proverb in France. The theory of most non-professional persons, and even of physicians, that gonorrhœa is a harmless illness, is as frivolous as it is unjustifiable. Subsequent infections are less painful, but more obstinate than the first one. The prognosis of the hæmorrhagic and croupous forms seemed to us for a long time less favourable than it is in reality. We have already spoken of the course of some of the complications, later on we will discuss the others.

We consider the prognosis of confirmed chronic gonorrhœa to be doubtful, and even unfavourable, with regard to complete cure. We do not even consider it *quoad vitam* as absolutely favourable. We have several times seen patients attacked with gonorrhœa succumb at the end of six months to pyelitis and pyæmia; in others tuberculosis starts from the urethra; others are carried off by septicæmia originating from complication with bubo. Gonorrhœal arthritis sometimes becomes fatal (*Holst* and others). Finally, death may occur very rapidly by peri-urethral urinary infiltration leading to gangrene (*Vajda*, *Petersen*). The more inexperienced and non-critical the physician who applies his "new" method, the larger are the number of cases cured in his statistics. If the prognosis of gonorrhœa becomes less favourable than it used to be, the reasons are to be looked for in the rough hands of the physician. Neurasthenia, usually complicating gonorrhœa, makes local treatment difficult, and thus aggravates the prognosis. Chronic gonorrhœa must not, however, be considered as an incurable disease. We have seen chronic forms with various complications completely cured. *Nöggerath* was the first to insist on the fact that chronic gonorrhœa in the male affects the genital organs in the female; but we do not agree with him that this affection is necessarily incurable, and that it is the rule that the man who has chronic gonorrhœa must necessarily infect his wife. We believe in the possibility, but not in the necessity. Were this not the case, the majority of women would become infected soon after their marriage. As it is, we know a great many women who, in spite of being married to men suffering from chronic gonorrhœa, have remained perfectly healthy.

We cannot too much insist against the idea of believing a case cured as long as the urine contains filaments, and until the latter is not proved to be the pathological result of mechanical irritation of the urethra.

TREATMENT.—About ten years ago, *Auspitz* stated that, in comparison with the great progress of pathology, the treatment of gonorrhœa could boast of but few advances. The reason was to be sought for in a non-scientific and rough, irrational technique. Although the importance of a great many results cannot be denied, we must still up to the present time candidly confess that *Auspitz's* view is correct. It is difficult, however, to deny

that there are slow signs of progress in the principles of the treatment of this affection, and, in spite of many errors in the employment of suitable treatment, favourable results may be expected to increase, results which the old treatment was unable to produce all at once. Be that as it may, the treatment of gonorrhœa forms, as *Finger* judiciously remarks, not *in spite of*, but *on account of* the abundance of boasted means and methods, the most thankless chapter of any on treatment. "One after another so-called infallible methods make their appearance; one after another they fall into well-merited oblivion" (*Posner*).

Prophylaxis.—The emission of urine immediately after suspicious connection has not much prophylactic importance. The same may be said of antiseptic injections made immediately afterwards, injections incapable of arresting infection once established. The rapid penetration of gonococci between and into the epithelial cells explains this fact. Injection of a 2 per cent. solution of nitrate of silver, made at latest a quarter of an hour after connection, recommended by *Haussmann*, is deserving of the greatest confidence. But who would submit to these very painful injections? The condom only offers a relative guarantee, and we are content to dispense with a more minute description of its prophylactic importance. The prophylaxis of gonorrhœal ophthalmia and of ophthalmia neonatorum does not come within the scope of this work.

We do not believe in the possibility of arresting gonorrhœa by the energetic caustics recommended by *Ricord*, and applied again latterly by *Funk* and *Poel* (nitrate of silver, caustic potassium, corrosive sublimate). The negative experiences of *Zeissl*, who, in spite of the exfoliation of the mucous membrane, has always observed gonorrhœa follow its regular course, are decisive for the importance of this abortive method, to which importance continues to be attached even when using the mildest caustic injections. On the other hand, the prostate, the neck of the bladder, the testes, are exposed to dangers resulting from intense irritation caused by regular cauterization of the mucous membrane (*Bryson* and *Burnett*). With the latter one can, in fact, really "drive out Beelzebub with the power of the devil" (*Neudörfer*).

Regarding the treatment of acute gonorrhœa, it may be considered as follows:

1. *Local* treatment with injections.
2. *Internal* treatment.
3. *Hygienic* treatment.

We have no intention to enumerate or to discuss the numerous substances employed or recommended for injections. Their use, limited to the genuine forms of anterior urethritis, according to *Milton's* process, appears to us justified if one remembers the fact that the liquid does not penetrate into the posterior part of the urethra. It is stated at the present time that the injection by

forcing the infectious discharge backwards may produce posterior urethritis, and thus favours the production of strictures, but this opinion has not yet been decisively proved.

We can distinguish two groups of drugs—antiseptic and astringent. *Antiseptics* are used to destroy the cause of the disease, the gonococci, and consequently correspond to the causal indication; but following the unanimous advice of competent authorities, advice completely in accordance with our personal experience, the general expectation and hopes entertained *à priori* have been completely unfulfilled. The *astringents*, which form the other group, are employed to moderate the secretions conforming to symptomatic indication. There is not, perhaps, a single substance belonging to one of these two groups to which this or that author has not attributed an astonishing effect. Nearly every physician has his favourite preparation.* The choice of the drug appears to us to be, comparatively speaking, of secondary importance; the method of application is a much more essential point. Notwithstanding, the scepticism of certain physicians regarding antigonorrhœal medication is as prejudicial to the patient as it is unjustifiable. Regarding the *mode* of action, *Oberländer* represents it in the following manner. The penetration of urine into the epithelial erosions and into the disintegrated mucous membrane, and the catarrhal secretions, hinders cornification of the epithelium, which tends to recovery. This cornification is aided by injections of astringents, which banish secretions, and aid the formation of new healthy layers of tissue. If in pyelitis and cystitis the action of the astringents internally administered has seemed to us problematical, it may be explained by the state of extreme dilution produced by the urine. It is different in those cases of gonorrhœa where the degree of concentration depends only on the physician.

Although the gonococci outside the organism are very frail, their power of resistance is considerable when they have invaded the urethral mucous membrane and the living tissues. We warn our readers against relying on the results obtained experimentally by the action of different antiseptics on the pure cultures of the gonococcus, or by the examination of the discharge (dependent on the fact whether a micro-organism is present) made directly after this or that injection. In practice the inconstancy of theoretic results is soon seen. Apart from the doubtful experiments, according to which a number of parasiticides (resorcin, thallin, quinine, etc.) have been looked upon as destructive to the gonococcus, we wish to say a few words on the action of one substance, *perchloride of mercury*, which is recognised even by the greatest sceptics, and considered by *Oppenheimer* as the most certain, and even as a sovereign, remedy against

* We have seen good results from the use of injections of a solution of pyoctaninum flavum, 0·05 : 100.—W. H. G.

gonococci. We are thoroughly convinced that the temporary disappearance of the gonococci from the discharge can thus be most readily obtained, either by means of frequent injections of corrosive sublimate or with *injections of calomel* (see below). For all these reasons we agree with *Welander*, and believe that the *gonococcal theory has no influence on the therapeutic results obtained in gonorrhœa.* This author has given up antiseptics, and uses astringents. Nor do we consider that rational measures, recently so much praised as fatal to the gonococcus, are able to produce tangible results. We cannot except hot water, the use of which, strongly advocated by *Gordon, Curtis, Kreis, Schutt, Brewes*, and others, has been useless, and appears, according to the recent and very exact observations of *Keyes* and *Blackwell*, to be even harmful.

Whether we use the above drugs, or carbolic, salicylic, boric, benzoic acids, permanganate of potassium, chlorate of potassium, chloride of lime, aromatic wine, iodoform, naphthalin, creosote, creolin, chloral, alkalies, mineral acids, etc.; or, again, acetate, sulphate, chloride of zinc, of copper, of lead, of iron, alum, nitrate of silver, tannin, tannic acid, hydrochinon, red wine, alone or combined, or balsams, sulphate of lime, sulphophenate of zinc, ichthyol, or other substances, the following rules must always be adhered to.

1. The injected substance should not cause any inflammation, nor have any caustic action. *Berkeley Hill* declares every *painful* injection to be too strong for acute gonorrhœa, and there is some truth in this opinion. This does not, however, apply to all cases, the sensitiveness of patients being a varying quantity. As a general rule, substances, such as carbolic acid, the antiseptic action of which can produce by the degree of concentration an intense irritation, should not be used. For this reason we prefer *benzoic acid*, which in a solution of 1 per mille is not irritating, and has a bactericidal action. Solutions of *perchloride of mercury* cannot be too weak (0·05 to *at most* 0·5 per mille). The changes undergone by perchloride of mercury in the alkaline pus, viz., into insoluble compounds, considered by *Bockhart* as a drawback, is practically no disadvantage. If the urethra be specially sensitive, and there are persons who cannot even bear an injection of cold water, the solution must be warmed to the body temperature. Frequently the mucous membrane becomes accustomed to it after a day or so, and the usual strengths of injections are borne with ease. The addition of opiates to the injection is useless. We have given up resorcin (*Münnich, Letzel, Hofmann*) and sulphate of thallin (*Kreis, Goll*), as we never observed favourable results from them. *Castellan* recommends *alkaline* injections, especially those of bicarbonate of soda, 10 per cent., which he considers as the most active poison against the gonococcus. *Castellan's* ideas, shared by many others, are

founded on an error. He contends that micro-organisms thrive best in an acid soil, proved to be an error by *Barduzzi's* careful researches. *Rand* is equally against alkaline injections. Local applications of very acid solutions are more rational, but their temporary contact with the mucous membrane and their rapid neutralization does not lead one to expect appreciable results.*

2. The injection should only be made after the urethra has been thoroughly freed of discharge, and with a solid, hermetically-closed syringe, which works easily, and contains at most 5 cubic centimetres. The best syringe is one made of thick glass, with a metal or indiarubber garniture, provided with a thick conical, but not cylindrical, end, 1 centimetre long, which can be inserted into the urethra and fixed by pressure on the glans. The injection must be made slowly, the patient being in the dorsal position and the meatus looking upwards. The contents of the first injection should flow rapidly away, but the second, and if necessary the third, should be kept for some minutes in the urethra. Under these conditions the liquid will never pass into the bladder. We have no personal experience as to the especial value of complicated syringes, and irrigating apparatus, of which various kinds have latterly been manufactured (*Von Vajda* and others). We doubt whether physicians and patients will decide to abandon the well-known effective syringe for these complicated instruments. *Squire*, on the other hand, has invented a small syringe provided with a kind of bellows, which on pressure ejects the fluid, a very convenient and easily carried syringe. The new method of French authorities is to make return current injections into the anterior part of the urethra (*Aubert*, *Bourgeois*, *Fraud*, *Diday*, and *Langlebert*, who in 1854 invented a syringe "à jet récurrent"), by inserting a thin elastic probe as far as the bulb; this method is justified by the fear of infecting the posterior part of the urethra. It favours the exit of viscous masses of mucus adherent to the mucous membrane. This latter object may be attained by the irrigator of *Gröningen*, and that of *Zülzer* and *Lobenstein*. The former is provided at its urethral extremity with an olive-shaped bulb perforated at its base, whence the liquid flows from behind forwards. In the latter, occlusion of the urethra is obtained by a kind of bell fastened to the urethra, while the liquid flows

* *Pelissier* has employed lemon-juice for the treatment of gonorrhœa, as it has a parasiticide effect, and at the same time gonococci are destroyed by acid. In cases of urethritis anterior, *Pelissier* either has a 1 per cent. solution injected six times a day, or rinses out the front part of the urethra once a day by means of an irrigator and soft catheter, with 1,500 grammes of an 8 per mille solution. With the injection, cure is effected in eight to ten days, with the irrigator in four or five days. In cases of urethritis posterior, *Pelissier* injects (immediately after the patient has passed urine) 400 grammes of the weaker solution, by means of a firm catheter (which, like the soft one, must never be greased, but simply wetted with water) into the bladder. The patient must then again urinate, and thus the whole urethra is cleansed. This manipulation is to be repeated till 1,500 grammes have been used.—W. H. G.

through four fissures in the catheter. *Schütze* uses a furrowed tube provided with another one covering it. In order to guard against dangers of distension of the urethra by injecting liquid capable of forcing the barrier of the compressor urethræ, *M'Vail* holds the walls of the urethra apart by aid of bougies in the shape of a hairpin, which does not prevent the necessary pressure being exerted on the surface. Finally, *Petersen* and *Finger* have invented an apparatus with which the pressure of the injection can be regulated. It is obvious that, *ceteris paribus*, these instruments must be more efficacious than ordinary syringes, as they contain the quantity of liquid sufficient for many injections; while more than 5 cubic centimetres contained in a syringe cannot be considered quite harmless. Be this as it may, the old syringe, simple and cheap, will still hold its own for years.

Neudörfer recently proposed a singular method of local treatment. Starting from the theory that all substances exerting an astringent and caustic action on the mucous membrane are injurious to irritated cells, he *deadens* the urethra (by injections of cocain, morphia, belladonna, antipyrin, etc.), and makes simultaneous inflations of air (by means of a metallic probe) to accelerate the course of suppuration.

For many years we have been content to prescribe *Ricord's emulsion*, which we consider the most rational and effective anti-gonorrhœal injection. According to the sensitiveness and age of the patient, the concentration varies from ½ to 4 per cent. (thus: Plumbi acetatis, zinc. sulphatis, āā 0·25 to 2·0; aq. font., 200·0. To be shaken). The solution is composed principally of acetate of zinc and of a precipitate of finely-powdered sulphate of lead. When the latter is deposited in the folds of the mucous membrane, soluble lead compounds are formed, which *in statu nascenti* have a lasting effect. The good results obtained with this preparation in the majority of cases cannot be denied. *Ultzmann's* objection to this preparation, that the fine powder of sulphate of lead, by obstructing the excretory ducts of the small urethral glands, produces follicular abscesses, appears to us unjustifiable, for we have never met with this complication in the thousands of cases treated in this way. *Eraud* had the same objection with *bismuth* in solution of 1 to 2 per cent. (a substance recommended for the last thirty years by *Caby*), which, according to his opinion, even leads to the formation of stone. Nevertheless, *Ricord's* treatment is not successful in all cases. We then substitute a solution of nitrate of silver, 1 : 2,000 strongly recommended by *Neisser*, or a mild solution of salicylic acid with a few drops of perchloride of iron (solutio. acid. salicyl., 0·1 to 0·5 : 200·0; liq. ferr. sesquichlorat., gtt. i-v), or, finally, the combination, sometimes so very efficacious, of calomel (vapore parat.) and iodoform (puriss. pulverisat.), 0·5 to 2·0 to 200·0 liquid. This latter emulsion combines the quality of limiting secretion with

that of the painless action of perchloride of mercury. Application of *dry* powders (boric acid, calomel, bismuth, etc.), latterly so highly recommended by *Zeisler*, appears to us of doubtful efficacy.

If the above-described complicated instruments are not employed, two or three injections, according to the intensity of the gonorrhœa, should be made daily. In the third week one injection per diem is sufficient; in the fourth week one every other day; in the fifth week two injections, even when the discharge has stopped. It is evident that individual susceptibility often necessitates variations. *Finger's*, *Lesser's*, and *Seidel's* advice only to commence the injections when the acute stage of inflammation has subsided appears to us justified, but we can only partially agree with the first-named author's explanations on the subject of the bactericidal part which these injections play. We consider the assertion of certain authors (*Bryson* and *Burnett*), that local treatment commenced too soon favours the transformation of acute processes into chronic ones, to be without much foundation, and by no means proved. During the acute stage a great many patients cannot bear the introduction of an instrument. In these cases preliminary cautious injections of cocain are to be recommended.

If in the course of the third week we do not notice any remarkable effect from injections, which hardly pass the bulbar portion, we order *internal* treatment, especially balsam of copaiva. In any case, this treatment is of secondary importance. It has been proved empirically, as well as experimentally, that copaiva balsam is efficacious in a certain number of cases (*Ricord* observed in hypospadias, under the influence of copaiva, the process disappear more rapidly in the posterior than in the anterior part). The active substance which passes into the urine is *copaivic acid* (*Weikert*, *Zeissl*). This substance is precipitated in the urine by nitric acid, which frequently causes confusion with albuminuria. In a certain number of cases large doses (2 to 3 grammes several times a day) produced unpleasant symptoms, such as dyspepsia, vomitings, diarrhœa, erythematous eruptions, and those resembling urticaria, or even lesions of the kidneys and the bladder, no matter what form of administration, emulsion, pills, capsules, etc. (pills and capsules to be taken at meals are to be recommended). The drug may in certain cases be given in enema, or without the volatile oil contained in the balsam (*Paquet*), and given in the form of copaivic acid or copaivate of soda. Nevertheless, *Rocco da Luca* and *Amato* have proved that neither copaivic acid nor essence of copaiva, which passes into the urine in the form of a salt and readily breaks up into acid (*Quincke*), possesses the same action as the resin itself. One may usually use *cubebs* instead of copaiva, but with less chance of success; or turpentine, Peruvian, Tolu, and Gurgun balsams, *matico* (Piper angusti-

folium), abietic compounds, cannabis americana, fluid extract (not alcoholic) of hydrastis, *oil of sandalwood*, may be used. Experiments made with the last-named substance have given very contradictory results. Some authors have found it very efficacious in chronic gonorrhœa, and inefficacious in the acute forms (*G. Meyer*); others, on the contrary, have found it effective in acute gonorrhœa and useless in chronic forms (*Posner*, *Linhart*, *Leubuscher*, *S. Rosenberg*). The last-named has rightly drawn attention to certain complications which could be imputed to the use of this substance, complications such as dysuria, hæmaturia, renal pains, dermatitis. Complications of cystitis are said even to have given way to doses of 15 to 20 drops daily of oil of sandalwood. We have never employed this substance to any great extent. For the sake of completeness we must not forget to mention *kawa-kawa*, introduced thirty years ago by *Gobley*, and which has latterly again come into fashion. It is an extract of the roots of Piper methysticum, the favourable action of which (*Hubler*, *Sanné*, *Rand*, and others) has been justly doubted by *Cuzent*.

Our personal experience inclines us to adopt *Ultzmann's* views, and does not permit of our attributing great importance to internal medicinal treatment of gonorrhœa. We should even consider this treatment as irrational, as, instead of choosing the shortest way to act on the urethra, the stomach, the blood, and the kidneys are attacked, if rebellious cases did not exist in which internal treatment has proved itself much more efficacious than local treatment.

Hæmorrhagic discharge only requires rest. Profuse hæmorrhages are only observed after the introduction of *Nélaton's* bougie (*Horovitz*). Nevertheless, we have observed phenomena of vesical irritation after the introduction of soft bougies.

Hygienic treatment is of considerable importance in cases of acute gonorrhœa. First of all comes *rest*, which, according to *Zeissl*, together with a bland diet and cold local applications, is of the greatest importance. Unfortunately, as long as complications of violent lymphangitis, peri-urethral abscesses do not exist, the patients never consent to keep their beds, so that *Zeissl's* advice to apply ice on the affected part for several hours a day is seldom followed. We have given up prescribing absolute rest, but we strictly forbid physical exertion, such as walking, riding, gymnastics, shooting, dancing, long drives, etc. We also insist on the patient wearing a good suspender, although this precaution is not a certain guarantee against inflammation of the testes.

Regarding *diet*, it has often been proved that large meals and stimulating fluids decidedly aggravate the condition. Many physicians forbid coffee, tea, beer, and wine absolutely. Personal observations, based on large experience, have proved to us that

this strict diet may have very disagreeable consequences, in so far that the first cup of tea or glass of beer enjoyed by the patient, after long abstinence, leads to renewal of the discharge in an alarming manner. We therefore allow our patients a small quantity of these drinks (at most a quart of beer daily),* but we strictly forbid all *excess* in alcoholic beverages. Effervescing waters in moderation are not harmful. We do not recognise assurances to the contrary of timid individuals. Prohibition of meat, of sour and salt dishes, is not rational. It has not been proved that mustard, pepper, and radishes produce inflammation. What a contradiction the administration of drugs of the pepper kind would otherwise involve! Contrary to the advice of several authors who recommend a large consumption of water in order to obtain dilution of urine, we advise (like *Zeissl*) the patients to consume as little liquid as possible, especially in the first few days: firstly, so that they suffer as little as possible by passing urine less frequently, and, secondly, that the injections made into the urethra have more time to act. The bowels must be carefully regulated. Abstinence from coition is absolutely necessary.

Against the *very painful* nocturnal erections and chordee, as also against other urethral pains, lukewarm baths and narcotics (especially morphia in subcutaneous injections or in enema, but not as urethral injections) have a much better effect than cold injections, bromide of potassium, camphor, lupulin. But it is evident that the physician should only have recourse to morphia when the pains are unbearable.

If abscesses form in the region of the infiltrated parts, they must be opened without delay in order to avoid the formation of urethral fistulæ, which would be fatal. If necessary, the patient must be forbidden to urinate, and the catheter must be used at the onset (*Horand*).

In *chronic* gonorrhœa we also try, in the first place, methodical treatment with injections. In the second place, we administer balsams internally. But if, as often happens, both methods fail, it may be assumed with certainty that in the majority of cases the process is not limited to the anterior part of the urethra, but that urethritis of the *posterior* part of the urethra, or inflammation of both parts with serious lesions and anatomical alterations of the mucous membrane, may exist, which call for energetic local treatment with astringents, and even caustics. In such cases "gonococcicides" are useless. It is impossible to form an idea of the stupid and trivial way in which physicians and charlatans make use of these antiseptic injections, which act on the healthy anterior part of the urethra, and do not touch the posterior part.

One is therefore authorized to say that in all cases where the chronic inflammatory condition has got beyond the region of the

* Lager or Pilsener beer. All English beers, stout or porter are to be avoided.—W. H. G.

compressor urethræ, or is localized to the posterior part of the urethra, injections should be conducted beyond the compressor urethræ into the posterior part. For this object various instruments are used, besides those already mentioned. We may describe the following:

1. *Diday's irrigation catheter.* The oldest form of this (1858) consisted of a fine elastic catheter, which was introduced into the posterior part of the urethra, and which allowed of the passage of the contents of the syringe.

2. *Guyon's urethral syringe* (1869), composed of a hollow, bulbous-ended bougie introduced beyond the compressor urethræ. A *Pravaz syringe* with a screw piston is fitted to it. The contents flow drop by drop through the central or bored bulb. We have already mentioned this "installation apparatus" in the part on the "Therapeutics of Cystitis."

3. *Ultzmann's irrigation catheter* (1883), constructed on *Diday's* principle, is pierced with several holes at its urethral extremity, and is joined by means of a long tube to a large syringe.

4. *Ultzmann's urethral injector*, constructed on the lines of *Guyon's* installation apparatus, with this difference, viz., that the capillary catheter has a curvature.

5. *Gschirhakls* and *Ultzmann's brushing apparatus*, composed of a brush containing a caustic solution and enclosed in an endoscopic tube, beyond which it is movable.

6. *Dittel's porte-remède*, with its modifications. A detailed description is given further on.

7. *Ointment syringe* (*Tommasoli*) is composed of a curved catheter, which can be filled with lanolin ointment, emptied by means of a piston.

8. *Unna's* and *Casper's ointment probes*—the former of zinc, covered with thick ointment, the latter of silver, and with furrows destined to receive melting substances.

9. *Stephan's "antrophore"* is composed of a central metallic probe covered with a soft mass, which is melted by the warmth of the urethra.

All these instruments may be employed; all have advantages and disadvantages, which latter are overcome by the skilled operator.

As a general rule—we follow here *Finger's* indications, which cannot be considered as decisive, as they have not been confirmed by the endoscope—irrigation is suitable for diffuse recent forms, and the other instruments, catheters excepted, to old, circumscribed, superficial processes. The probes, and especially the dilators, are of service where the submucous infiltrations have already led to a commencing stricture.

For local treatment of the posterior part of the urethra, we give the preference to the medicated urethral bougies made of cocoa-butter; these are inserted into the urethra. They can be

introduced by means of *Michelson's* porte-remède. They gradually melt, and exert their specific action. This instrument (Fig. 9), which is a modification of *Dittel's* porte-remède, is composed of a hollow catheter, the front part of which presents a short and slight curve, and is armed with a stylet of thick wire, provided at its end with a bulb exactly fitting the circumference of the catheter. It is of great importance that pure cocoa-butter be used for medicated bougies, the circumference of which must be slightly under that of the opening of the porte-remède (a prescription mostly used is: Rp. bacill. urethral. ex ol. cocoa pur. longit. 1 cm. cum argent. nitric. 0, 0i. D. tal. dos. N*x*). Of all drugs, nitrate of silver has given the best results; next come iodoform, balsams, and other drugs.

FIG. 9.—PORTE REMÈDE.

All patients do not bear bougies of nitrate of silver in the same manner; some can bear strong ones from four to eight hours, others can only stand the weakest for an hour. Usually, more or less intense irritation resembling acute gonorrhœa, more or less abundant excretions of pus and blood, follow their introduction, and this may last several days. According to the intensity of the reaction, we introduce the bougies every five to ten days, when the irritation has passed off. If the first bougie sometimes causes pain, localized to certain parts (erosions), this disappears with the succeeding bougies. This method cannot be employed in the case of nervous patients, nor with those suffering from neurasthenia, who, even after the introduction of weak bougies, fall into a state of indescribable melancholia. On the other hand, we have seen patients bear without pain bougies containing 30 per cent. of nitrate of silver. We have never seen these bougies lead to cicatricial stricture. This reaction explains why the introduction of medicated bougies of nitrate of silver with the old-fashioned *sonde à piston* sometimes gave excellent results. At the same time, this latter method should not be employed. The "pistol" recommended by *Senftleben*, unaware of the original, is a harmless imitation. It conducts gum, sugar, glycerine bougies, by means of a whalebone stylet through a celluloid tube.

As to the results obtained by us with these bougies, we do not deny that in 50 per cent. of the cases the effect was nil. The other 50 per cent. showed considerable improvement, and some, but only a few, were even quite cured. Never-

theless, from the prognostic point of view, these results are very satisfactory, and, according to our experience, can only be compared to those obtained by *irrigation*. The fact that *Leubuscher* found these latter (with 0·5 per mille solutions of nitrate of silver) more effective, that by keeping in view the numerous confirmatory facts one has been able to remark others where bougies have not been successful, proves to a certain extent that the therapeutical indications have not been followed, and that the patients, after the introduction of the suppository, did not remain at least five minutes with the penis held upwards. Manual awkwardness in the operation may spoil the results of the best method.

It is equally impossible to prevent the melted mass from penetrating into the anterior part of the urethra, whether *Michelson's* porte-remède is used, or one of the modern antrophores. With regard to the latter, those only that are medicated at the anterior extremity (*i.e.*, in the prostatic part) must be recommended. We do not believe that the thallin antrophores are to be preferred to nitrate of silver or iodoform antrophores. In the face of the more or less favourable results obtained by *Nachtigal*, *Kraus*, *Lohnstein* (the latter states he cured (!) twenty-two cases out of twenty-eight of chronic gonorrhœa), *Leubuscher*, *Jstamanoff*, and others, have observed cases where the results were *nil*, and others where aggravation (*Hill*), alarming complications, rigor, hæmaturia, cystitis, accompanied by pyrexial cystitis (*Altschul*), occurred. We ourselves have not seen these complications, but we have noticed in some cases intense irritation. *Leubuscher* himself has seen few favourable results with thallin antrophores, which, on the contrary, have sometimes caused cystitis and epididymitis.

Regarding *Guyon's* instillations, to which we have already referred, and which are much used in France, we possess reliable statistics by *Weiss* and *Delefosse* of 312 cases. The application of solutions of nitrate of silver of 1 to 4 per cent., continued sometimes for nearly six months, has given very good results. Nevertheless, this method has not proved successful in every case.

With regard to the implication of the glandular parts and a tendency to stricture, recourse must be had to dilatation. *Otis* was the first to treat "extensive strictures" with instruments which stretched the contracted urethra back to its normal width by methodical catheterism, by means of graduated bougies. We ourselves have obtained by this methodical treatment of the urethra excellent results as regards the objective and subjective symptoms, by using indifferently metal or gum-elastic bougies. *Feibes* insists rightly on the value of *Béniqué's* metal bougies. According to the susceptibility of the patient, the bougie is inserted daily and left in for periods varying from a few minutes to some hours. The size of the instruments must only be increased gradually (see "Stricture"). Bougies of large size

used by American physicians and by *Ultzmann*, and which may only be introduced after an incision of the meatus, appear to us to be disadvantageous.

We believe that sizes 18 to 24 of the French scale (numbers 10 to 14 of the English scale), corresponding to diameters of 6 to 8 millimetres, produce sufficient distension of the urethra, and suitable compression of the proliferated tissues—all the more so as the favourable result consists in the compression of the tissues, and not in the obstacle which it places in the way of the blood coming to the surface of the mucous membrane. One may combine the mechanical action of the bougie with an astringent or caustic action—*i.e.*, a superficial and a deep action—by using *Unna's probe à pommade*, consisting of a metal probe covered with a mixture of cocoa-butter, wax, and nitrate of silver. With the same object in view, *Casper* lately uses a bougie with six furrows covered in a similar way. It is certain that all these instruments, which unite the principle of dilatation and cauterization, give favourable results, but they also give rise to symptoms of irritation, and may even affect the bladder (*Appel*, *Von Planner*). *Fleiner* has simplified the preparation of the ointment covering by using smooth nickel-plated steel bougies. The entire urethral mucous membrane is acted on by the ointment. This must be considered a disadvantage, as already observed. *Finger* rightly emphasizes this point.

We can offer no personal opinion on the value of *Tommasoli's* ointment syringe, as we have never used it. *Posner* is not enthusiastic about it.

Auspitz had already succeeded in obtaining a dilating action on the urethra by means of his spring endoscope, but it was *Oberländer* who invented (at the same time as *Von Planner*) an instrument with which rapid dilatation with breaking down of the constricting infiltrations could be obtained.

Oberländer's instrument carries a regulating screw, and it may be used for the different regions of the urethra. The principal advantage of this instrument (although very expensive), which is covered with indiarubber, consists firstly in preventing the tearing of folds of mucous membrane, which so often occurs with *Auspitz's* older instrument; and whereas in internal urethrotomy (see "Stricture") (Fig. 10), as practised by *Otis* and others, the incision was made in the dark, and it could not be ascertained whether the incision had been made in healthy or diseased tissues, with *Oberländer's* instrument the chief incision is made at the level of the most infiltrated parts.

Our own personal experience confirms these facts, and we do not agree with *Finger* and others who object to *Oberländer's* instrument. The manner in which patients bear this procedure, even when the instrument is applied by skilful hands, varies considerably, and if *Oberländer* states that out of more than

5,000 dilatations of the urethra, made with his instrument (with and without cocainization of the urethra), nothing unforeseen ever occurred, he is mistaken, for his opinion does not agree with that of his patients, who came to us *after* having been under his care. We do not mean to imply that these patients did not benefit from *Oberländer's* treatment. Some of them, however, complained of certain complications, such as vesical irritation, collapse (from cocain), hæmorrhage, etc. Be that as it may, in spite of its being very rational and in spite of its decided value, *Oberländer's* method offers certain inconveniences. This applies, however, to all instruments devised for the treatment of chronic gonorrhœa. Perfection is very rare—in fact, does not exist.

FIG. 10.—OBERLÄNDER'S DILATATORIUM.

It is hardly necessary to insist on the necessity of strict antiseptic disinfection of the instruments before and after use.

Apart from irrigations with weak, non-irritant solutions, the method just referred to produces mechanical irritation of the affected parts, which is shown by a more abundant secretion, and by the expulsion of bodies similar to the gonorrhœal filaments already described. This sometimes goes on several days. Under these conditions "gonorrhœal filaments" have not their usual prognostic and diagnostic value. Nevertheless, we recommend a pause in the treatment when these filaments appear in the urine. Nothing seems to us more irrational than to persist with the irrigations at any cost when the urethra revolts against all surgical interference and local treatment. We have seen the condition of victims of these fanatics for local treatment improve considerably when the urethra has been allowed to rest for a time, and we cannot do better than emphasize *Finger's* advice to let the patients who have been undergoing local treatment have complete rest for several weeks. This is especially important in cases of hysterical and nervous persons, who sometimes unfortunately beg the physician—young specialists usually accede to the request—to continue a treatment which can only prove injurious to them. If in these cases good results are occasionally observed—explained by the psychical influence on the patient—the rule holds good.

The *endoscopic therapeutic method*, which allows of careful local treatment of the circumscribed mucous lesions, such as are frequently observed in chronic gonorrhœa (*Tarnowsky, Auspitz, Grünfeld, Gschirhakl*, and others), gives no results in cases of

deep infiltration. For this reason this method has not become popular with us. *Finger* speaks very decidedly against it.

It is very remarkable that certain cases of chronic gonorrhœa, after having resisted all treatment for years, suddenly get well. This is, however, very rare.

It remains for us to say a word on the treatment of papillomatous *growths*, concerning which we have already spoken in detail. These conditions may last for years, and can only be discovered by an endoscopic examination. Local interference then becomes a necessity. Instead of the old instruments (sharp spoon, forceps, guillotine) used by *A. Rosenthal, Grünfeld*, and others, *Oberländer* recommends as a rapid method the introduction of two *firm* tampons of wool, which, while the penis is extended, are turned and twisted several times, and which allows of the morbid growth being destroyed and removed.

The treatment of para-urethral folliculitis consists in cleansing the infected follicles with nitrate of silver, corrosive sublimate, etc., or even in cauterizing them with the point of a burning-hot needle or with a fine thermo-cautery.

Hygienic treatment should be on the lines already described by us. All excesses which infallibly produce acute inflammatory conditions must be avoided. But taking into consideration the long duration of the affection, one must not recommend complete rest nor too severe a regimen, etc. In cases of confirmed anæmia and weakness, strengthening diet is of great use, which, even if tubercular complications exist, can produce good results. Even when there is only a suspicion of gonococci, we do not allow cohabitation except with the use of condoms, although we are quite satisfied that the patients usually omit to follow our advice. We have already indicated the restrictions to which persons suffering from chronic gonorrhœa must submit when desirous of marrying. Consent may be more readily given when the gonococci in the urethral filaments and secretions become more and more rare. It is certain that the safest plan is to follow *Nöggerath's* advice, and to forbid marriage entirely. But the majority of patients will not believe this.

VIRULENT GONORRHŒA IN THE FEMALE.

Thanks to recent researches, the inflammatory conditions induced by the gonococcus in the uro-genital tract of women have been thoroughly studied. Nevertheless, gonorrhœa in the female is less known than in the male. This is first of all due to the fact that the symptoms are less acute, and to the diversities of the causes which in women produce mucous or purulent discharge. The methodical examination of a woman as to whether there are gonococci or not has always given valuable

results, as we already foreshadowed in the first edition of this book. But there are still many points unexplained.

Most remarkable progress has been made in *localization* of the affection. While only a few years ago the important part played by the mucous membrane of the urethra in the male was attributed alone to the vagina in the female, and the cases where other regions suffered from isolated affection (vulva, urethra) were considered so scarce that it was thought justifiable to refer to gonorrhœa in the female merely as *vaginal gonorrhœa*, modern researches as to the presence of gonococci prove that the vagina plays a secondary part as far as localization of these micro-organisms is concerned. *Bumm* goes even further, and refuses to admit that the gonococci have the power of penetrating the pavement epithelium of the vagina. He considers that vaginitis and vulvitis of gonorrhœal women is the result of the irritation and maceration of these parts by the gonorrhœal pus flowing out of the uterine cavity and cervical canal. This opinion is based on the negative results obtained by *Bumm* in the search for gonococci in the tissues and the vaginal mucous membrane. But as we have already seen, *Touton* has proved by his researches that the opinion, according to which gonococci only penetrate cylindrical epithelium (*Bumm, Gerheim*), has exceptions, and urethritis externa in the male is so far limited only in thick layers of cornified epithelium similar to the epidermis—*Fritsch* denies, and not without reason, the decidedly mucous character of the vagina—opposing itself in an absolute manner to the invasion of gonococci. Otherwise the existence of gonorrhœal vulvo-vaginitis in children might be doubted, which even *Bumm* does not venture to do. Be that as it may, regarding the specific gonorrhœal affection of the vagina, which some admit and others deny (satisfactory statistics on the connection between this affection and cervical gonorrhœa do not exist), the bacteriological researches of *Bumm, Welander, Bergh, Steinschneider, Lomer, Fabry*, and others, have shown that the gonococcus can more often be found in the *cervical canal of the uterus* and the *urethra* than in the vagina, and that if the uterine discharge ceases, the vaginal secretions contain incomparably less gonococci, a fact clearly proved by *Steinschneider*. *Martineau* considers uterine gonorrhœa as very rare, and asserts he has only met with it ten times in 4,000 patients. This view remains quite unique in science, and is contradicted by the positive facts brought forward by *Martin, Nöggerath, Sinclair*, and other distinguished gynæcologists. We have ourselves found gonococci in the cervical mucus of notoriously infected girls, who had been considered by medical men, who found no gonococci in the vaginal secretions, as quite healthy. For many years we have insisted on the importance of this latency of gonorrhœa from a practical and hygienic point of view, especially in the case of prostitutes. The extension of the

infection to the uterus and its appendages, and its consequences, is discussed in manuals treating of diseases of women. Statistics as to the frequency of these complications are still very contradictory. It is certainly an exaggeration to say that the gonorrhœal process always affects the genital apparatus from the vulva to the extremity of the Fallopian tube. Nevertheless, the localization of gonorrhœa in the Fallopian tube has been indisputably proved; but of 287 cases of affections of the ovary, *Martin* found a gonorrhœal origin in 25 per cent. *Nöggerath* considers gonorrhœal pyosalpinx as the most frequent localization of gonorrhœa in the internal genital tract, ovaritis, complications of peri- and para-metritis (produced according to *Bumm* and *Gerheim* by "mixed infection"), and peritonitis only coming after specific affection of the Fallopian tube. *Sänger* and *Conrad* agree in considering that one-ninth of gynæcological affections are produced by gonorrhœal infection, and they have found that in half the cases the gonorrhœa was localized in the appendages of the uterus, with their principal centre in the tubes. *Kroner*, who has studied the influence of gonorrhœa in the female during confinement, has arrived at no decided conclusion as to the duration of the results of confinement.

While former authorities considered *gonorrhœal urethritis* in women as rare—*Zeissl* is still of this opinion—others have met with it in the majority of cases (*Guérin*, *Niemeyer*). According to our fairly extensive personal experience, we agree with *Decourtieux*, *Blume*, *Martineau*, *Bumm*, and *Steinschneider*, in considering urethral gonorrhœa in the female as of frequent occurrence both from an absolute and a *relative* point of view. We must also add that the chronic form is much more frequent than the acute, and *Chéron* has met with the former five times more frequently. The urethra is involved in the gonorrhœal process in the female in *more than half the cases*.

From a practical point of view, it is interesting to know the localization of the gonorrhœal process in the follicles of *the external orifice of the urethra*. This urethritis externa was well described twenty-five years ago by *Guérin*, and the clinical forms well established by more recent works (*Pouillet*, *Martineau*, *Boutin*, and others). We have already studied the analogous form in the male. Peri-urethral follicilitis in the female often forms small fistulæ by the breaking down of the small abscesses.

Regarding the localization of the gonorrhœal process in the vulva, otherwise called "gonorrhœal vulvitis," we possess statistics equally at variance. In any case, in children one cannot incriminate irritation produced by secretions proceeding from the upper portions of the genital tract.

Pathological Anatomy.—The pathological anatomy of gonorrhœa in the female, apart from what we have just said, and of the presence of gonococci, is very little different from that of the

lesions which characterize the chronic or acute inflammation of a non-virulent origin of these parts. *Oberländer* has recently succeeded in discovering in prostitutes an affection similar to diffuse inflammatory hypertrophy of *Littré's* glands in the male, an affection localized in the female in the carunculæ, with the formation of irregular tumours, but without cicatricial tissue.

Van Cott insists on the frequency of the localization of gonorrhœa in *Skene's* tubular glands, situated in the neighbourhood of the external orifice of the urethra. Pathological processes similar to follicular urethritis in the male have never been found in the region of the nymphæ.

Symptoms.—When it is a question of well-developed acute gonorrhœa, pain during micturition is first noticed. Inexperienced physicians usually take it for a urethro-cystitic symptom. But when the patient is more closely examined, it is found that it is a case of irritation of the inflamed vulva by the urine. The principal source of these pains are the *erosions* which nearly always accompany gonorrhœa, which vary greatly in size, and are seated in the region of the vestibule, of the labia majora and minora, the perinæum, and even the adjoining parts of the thigh. Sometimes diffuse erythema and œdematous swelling, and even a true lymphangitis, much resembling syphilitic infection, is found about the labia minora.

Besides these modifications, the existence of a mucous or purulent discharge must be noticed. In *recent* very severe cases the discharge is creamy and yellowish-green, accumulated between the labia majora, in the folds of the vestibule of the vulva, and sometimes has an odour resembling the secretion of a large quantity of fatty acids by the inflamed sebaceous glands.

On examining the vagina with the speculum—and the examination should be made with precaution, on account of the inflammatory swelling of the parts, and sometimes of a condition of vaginismus—the classical lesions of catarrh, or, rather, an erythematous inflammation, will be seen, as, properly speaking, the vagina does not secrete mucus.

In *acute* forms redness and swelling of the mucous membrane are present, and often circumscribed erosions, sanguinary or covered with pus, accumulated in the depth of the folds. In cases of *chronic* evolution (with the exception of papillary proliferation resembling gonorrhœa in the male), of a granular aspect, etc., in a series of cases the vagina loses its soft, velvet-like consistency, and becomes exceedingly dry and hard. This "xerosis vaginæ," which is due to a great extent to prolonged local treatment with astringents, is very frequently observed in a highly developed condition in prostitutes. For details on the gonorrhœal affection of the vaginal portion of the uterus, of the cervix, etc., see manuals on gynæcology.

Microscopic examination of the vaginal secretion in cases of

gonorrhœa shows the same elements observed in the male, only in this case the *epithelial desquamation* is less abundant. The existence of monads has no particular significance. The research for gonococci in the female is much more difficult than in the male, on account of the existence of a large number of round and rod-shaped bacteria. In chronic forms these micro-organisms are present in such quantities as to completely mask the few gonococci still present. According to *Bumm*, there exist in the genital secretions of the female a large number of biscuit-shaped diplococci, especially during confinement. None of these micro-organisms have the faculty of *Neisser's* gonococcus of penetrating these tissues. In difficult cases, microscopic examination of the secretions can only be made after having cleansed the vagina and got rid of all these micro-organisms by means of suitable injections. In any case, it is very difficult to discover the gonococcus in vaginal secretions.

The symptoms of gonorrhœal urethritis are less pronounced in the female than in the male. Nevertheless, cases are met with in which the patients complain of violent pains during micturition and of dysuria. Spontaneous secretions of the urethra are only met with in severe cases. The extension of the morbid process to the bladder is not frequent, which is a point worthy of notice, considering the width and shortness of the female urethra.

Adenitis is even rarer in women than in men.

The frequent implication of *Bartholin's* glands is of special practical interest. *Zeissl* distinguishes the *inflammation of the excretory duct*, with viscous and purulent secretion, having a special tendency to become chronic. Through hindrance to excretion cystic tumours are formed, and this inflammation can, through intermittent discharge, even after the vaginal gonorrhœa has been cured, simulate the latter. Secondly, *Zeissl* distinguishes the better-known form of acute inflammation of the gland itself and its periglandular connective tissue, leading to suppuration. In the second case, when the gland itself is involved, fever and violent pain are present, the corresponding labium becomes swollen, and an abscess of the size of a nut or an egg appears after several days. When rupture or incision of the abscess, which is occasionally somewhat gangrenous, takes place, very fœtid pus is discharged. We have seen these acute abscesses occur several days after infection, sometimes after weeks or months, and even as a complication of an essentially chronic and latent gonorrhœa. Usually venereal excesses, interrupting the indolent course of the disease, are the cause. Chronic bartholinitis develops much more rarely in the course of acute gonorrhœa than during chronic gonorrhœa, of which it may even constitute the sole localization without the patients suspecting it in the least. The researches of *Arning*, *Bonnet*, and others have proved that the pus of acute bartholinitis and mucous purulent secretions of the

chronic form very frequently contain gonococci. Personally, after scrupulous cleansing of the orifices of the excretory ducts of the glands, we have often observed the presence of gonococci in the discharge of these glands, so that the negative results obtained by *Welander*, *Steinschneider*, *Bumm*, and *Gerheim* (the two latter have not even found gonococci in the tissue of the glands) have much surprised us. We have no right to suppose that in these cases the direct invasion of the gland with gonococci is replaced by a secondary mixed infection, which is probably limited to acute suppurations of the gland. Nevertheless, by taking all possible precautions, we have several times discovered in the pus of these abscesses *Neisser's* typical gonococci, together with pyogenous staphylococci and bacilli. Careful observers have proved in a very conclusive manner that women, especially prostitutes, attacked by chronic gonorrhœal bartholinitis, and whose genitalia were otherwise in a satisfactory condition, were quite capable of communicating their latent gonorrhœa from the discharge arising from the vulvo-vaginal glands, and *Fritsch* was not wrong in comparing the chronic infection through chronic bartholinitis to that of chronic gonorrhœa in the male.

DIAGNOSIS.—The diagnosis of gonorrhœa in the female, for the above reasons, is usually difficult, and sometimes even, especially in chronic forms, almost impossible, unless certain conditions do not exist. For the acute forms, inspection must in the first place decide that it is not a case of syphilis or of soft chancre. The disturbances, already described in discussing the symptoms, are not of great diagnostic value. Inflammation and swelling may exist in non-specific vulvitis—for example, in recently deflowered women. When once the acute inflammatory symptoms have disappeared, differential diagnosis with non-infectious leucorrhœa becomes very difficult. Then *urethral gonorrhœa*, which unfortunately does not always exist, is most important for diagnosis. In order to avoid all confusion on account of pus accumulated in the crypts adjoining the orifice of the urethra, the vulva and lower parts of the vagina must first be well cleansed with cotton-wool; then the finger is introduced into the vagina and the urethra is compressed. The discharge is usually only a single drop of pus, but we have sometimes seen it in considerable quantity.

A small quantity of muco-purulent discharge has a decisive value. If urethral gonorrhœa is not pathognomonic, as it may be met with in non-infectious vulvo-vaginitis and in the local affections of the urethra (polypus), it is still of great value. In prostitutes, who by means of injections modify vaginal gonorrhœa for the time being, the existence of a drop of pus in the urethra is a valuable indication. When the urine has been passed shortly before the examination, a second examination a few hours later is necessary. The existence of bartholinitis, such as we have already described, is also of great importance. By pressure on the more

or less indolent and tumefied gland, a small, very variable quantity of muco-purulent discharge can be squeezed out.

The presence of *gonococci* in the discharge clinches the diagnosis in the latter case. We have already spoken of the difficulties connected with the search for gonococci in the vaginal secretions. We only wish to add that these difficulties are due to the presence of a quantity of other bacteria, which cannot be differentiated either by their diplococcic appearance, or by grouping round the nuclei of the cells, or by the results of the application of *Gram's* method. These difficulties may be overcome by an examination of the contents of the urethra and the secretions of the cervix uteri (*Lomer*), obtained by means of a platinum wire introduced through the speculum. The remarks on this subject, when discussing gonorrhœa in the male, hold equally good for gonorrhœa in women. We must add that, apart from the frequent existence in the discharge of micro-organisms resembling those of gonorrhœa in the male (*Bumm, Oppenheimer*), a large number of cases exist in which the diagnosis based on the existence of gonococci may be doubted. We refer especially to those cases of vulvo-vaginitis in children in whom gonococci have been found. We are far from sharing the opinion of those (*Pott, Widmark, Aubert, Cséri, Israel, Lenander*) for whom these cases are not the expression of gonorrhœal infection, for we have seen in practice gonorrhœa of adults communicated in various ways to children—from sleeping in the same bed, from soiled linen and bandages, by thermometers, chamber-pots, and washing basins; only we cannot make up our minds to admit that epidemic "colpitis infectiosa," such as has been described by *Bouchut, Atkinson*, and latterly by *E. Fränkel, Von Dusch, Ollivier*, is exclusively due to *Neisser's* gonococcus, especially as we have personally observed an epidemic of the kind in the children's ward of the Friedrichshain Hospital. Our scepticism regarding the "typical" microscopic forms of these micro-organisms is explained by the impossibility of arresting this particular affection in girls, in spite of all possible precautions and most scrupulous cleanliness. *Von Dusch* insists upon the fact that this disease, so dangerous for little girls, seldom attacks adult women. We do not agree with *Fränkel* and *Von Dusch*, that it is only by chance that this condition is met with in scarlet-fever wards. *Fränkel*, who has tried to cultivate micro-organisms from infectious vulvo-vaginitis of children, micro-organisms which may be taken for gonococci, has failed in his attempts. We do not consider these two micro-organisms as identical (according to *Flügge*, a "micrococcus flavus" plays here an important part), and we firmly believe—especially for young practitioners—that great caution is necessary in diagnosing the gonorrhœal nature of the discharge on the strength of "gonococcic formations" found by microscopical examination. This in no way diminishes the

great value which we attribute to the microscopical diagnosis of gonorrhœa. We agree with *Nöggerath* that the microscopical examination may be omitted, but it is going a little too far to consider the diagnosis of gonorrhœa justifiable when a woman, a short time after marriage with a man apparently cured of his chronic gonorrhœa, is seized with painful sensations in the genital region, and without any noticeable symptoms falls into bad health, and suffers from mucous or purulent discharge, erosions, condylomata acuminata, etc.

PROGNOSIS.—If the condition remains localized to the urethra, it is more easily cured in the female than in the male. Acute forms of vulvo-vaginitis and abscesses of *Bartholin's* glands usually take a favourable course. Chronic forms yield only to energetic treatment. Gonorrhœa of the uterus and its appendages is especially obstinate. Sterility and marasmus are not rare consequences. In some isolated cases a fatal termination has been observed. But, on the other hand, modern operative gynæcology has produced genuine triumphs for the radical treatment of pyo-salpinx, etc. Regarding the connection between gonorrhœa and puerperal affections, authorities are far from agreeing. *Sänger* and others felt bound to admit that serious morbid conditions of an infectious nature exist in confinement, which are usually attributed to puerperal septicæmia, but which are in reality of a virulent gonorrhœal nature. On the other hand, *Kroner* and others have proved that a large number of gonorrhœal women have neither puerperal accidents nor frequent abortions. Our personal experience is more in accord with this latter opinion. A large number of complications which we have observed in gonorrhœa in the male do not exist in women.

TREATMENT.—The treatment is often analogous to that of gonorrhœa—above all, strict cleanliness, hip baths, and frequent vaginal injections of water and antiseptic or astringent solutions. During the acute inflammatory period the injections should be as much diluted as possible, and lukewarm. In cases of vulvitis, cold compresses and solution of subacetate of lead should be applied. Erosions must be treated by separating the labia by means of pledgets of cotton-wool covered with absorbing powder. Ointments should be avoided as much as possible. *Fritsch* especially recommends for the treatment of vulvo-vaginitis washing the part with fat-dissolving alkaline solutions.

As soon as the inflammatory irritation has subsided, energetic *local treatment* of the vagina should be commenced, without troubling about modern theories, according to which gonorrhœal vaginitis is simply the result of gonorrhœa of the cervix uteri. Regarding the choice of disinfectants and astringents, we can only repeat what we have already said when speaking of gonorrhœa in the male. For years we have adopted a treatment which has always proved very efficacious—viz., the in-

troduction of tampons of cotton-wool dipped in pure alum powder. The introduction is made through the speculum every day or every other day, or, according to the intensity of the reaction, the tampon is left in for one to twelve hours. As soon as the tampon is removed (traces of blood are of no importance), a vaginal injection must be given to remove débris, shreds, etc., due to the action of the alum on the discharge. Patients are at first usually alarmed at these things coming away. After having tried a number of modern methods, we have always gone back to alum, which satisfies the patient as well as the physician, and suppresses all smell, to the great advantage of the patient. We have sometimes even seen accompanying endometritis improve considerably under this treatment, a fact which is not in favour of the theory that vaginal gonorrhœa depends entirely on gonorrhœa of the cervix. Only in particularly sensitive persons, and especially in cases of vulvo-vaginitis in children, do we follow *Pott's* and *Schwarz's* example and recommend iodoform. We have had little success with nitrate of silver and perchloride of mercury. *De Sinéty* and *Henneguy* even declare that they have seen very bad results with injections of nitrate of silver. *Ricord* warmly recommends injections of solutions of acetate of lead made by means of the speculum.

Gougenheim follows *Mme. la Chapelle's* example, and introduces sachets containing alum and tannin. *Fritsch* is said to have obtained good results with tincture of iodine and the application of chloride of zinc. It is not our intention to dwell on the innumerable methods of treatment applied by specialists (gelatine capsules containing astringents, tannin-glycerine tampons), which may be of some use. The recently suggested permanganate of potassium and pyrolignic acid have no advantage over other antiseptics. They stain the linen and have a disagreeable smell, which will prevent their becoming popular. With children, if the affection is serious, an incision must be made in the hymen, in order to be better able to introduce the douche nozzle into the vagina. *Von Dusch* recommends immediate isolation of the little patients in case of endemic "colpitis infectiosa."

The *urethritis* which sometimes accompanies vaginal gonorrhœa is sometimes spontaneously cured when properly treated. If the cure is not spontaneous, excellent results are obtained by rapid cauterization of the urethra with solid nitrate of silver, according to *Zeissl* and *Drysdale*. As far as we know, complete cures are rare when once the disease has penetrated deep into the tissues. In these cases we have obtained very good results by dilatation of the urethra with a little stick wrapped up in cotton-wool, followed by cauterization. Theoretically injections into the urethra are not objectionable, but practically the difficulties are so great that this method cannot be applied. Balsams, useless in vaginal gonorrhœa as an internal remedy, are much recommended

Urethritis about the external orifice is treated in the same way as in the male.

A bold incision should be made into the abscesses of *Bartholin's* gland, and they should be kept open, under antiseptic treatment, for several days. Incision is also indicated when cysts form. If the wound has no tendency to heal, the bottom of the sac must be cauterized or the cyst removed. We have, however, seen cases heal after several months without excision.

Chronic bartholinitis is sometimes very obstinate. In some cases the process may be cut short by curetting the duct or by energetic cauterization. In other cases recourse must be had to *Fritsch's* method of extirpating the glands. This must be done as soon as possible, when inveterate infiltration exists.

Accompanying disturbances of the nutrition, anæmia, etc., must be treated on general principles. We have already discussed the hygienic treatment.

This is not the place to speak of the treatment of gonorrhœa of the uterus and the gonorrhœal forms of salpingitis, of peri- and para-metritis, of ovaritis. Patients suffering from these complications should be referred to experienced gynæcologists.

A description of two affections nearly related to gonorrhœa—viz., *gonorrhœal arthritis* and *warts*—follows.

GONORRHŒAL RHEUMATISM.

Arthritis Gonorrhoica, Blennorrhagic Arthritis.

In spite of all the doubts which still exist, the existence of articular rheumatism (peri-arthritis, inflammation of the fascia, of the tendons and the bursæ mucosæ, periostitis, muscular and neuralgic pains, should be considered as rarer complications of virulent gonorrhœa) must be unreservedly admitted, and not be considered as a mere coincidence. According to *Guyon* and *Nolen*, gonorrhœa only plays the part of a predisposing factor, in the sense that the resistance of the individual against external causes is weakened by the fact of the disease. But it may be objected that not half the patients, who have in the course of gonorrhœa acquired arthritis, have formerly suffered from rheumatism, or even seemed to be predisposed to it. The numerous differential signs which in their ensemble distinguish this affection from ordinary polyarthritis are described further on.

Pathogenesis.—The pathogenesis of the affection has remained obscure, notwithstanding the large number of works published on the subject. None of the hypotheses put forward are beyond criticism. It is obvious that a detailed description of all these theories would be out of place, and we must be content to merely mention them, discussing first the old theory of metastasis in the general and vague sense of the word, and in the next place refer

to that theory which treats of the affection as a symptom of a general gonorrhœal infection (*Guérin Lorrain, Lasègue, Martineau*). Amongst modern authors, some declare that gonorrhœal rheumatism arises from an irritative state of the urethra, and may be compared to arthropathies following catheterism. The affection is said to be produced by *reflex action*, and to depend on the *irritation of the urethral mucous membrane* or specific gonorrhœal inflammation. The majority of the supporters of this view admit the extension of the inflammatory irritation to the plexus sacralis and the spinal cord, and the existence of an affection of the trophic nerves, by reason of angioneurosis or other vaso-motor origin (*Lewin*). Another theory is that the condition depends on an affection of the genital organs, but is not necessarily of *specific origin* (*Lancereaux, Davies-Colley, Fraser*). Other causes, such as injuries, simple catarrhal puerperal condition, etc., may play a similar part, and in this way gonorrhœal rheumatism produced by the absorption of the toxic substances belongs to the same general group as "genital arthritis" (*arthrite génitale*). A third theory is that the affection depends on a *specific gonococcal infection*. Some authorities, who believe they have found the specific micro-organisms in joint exudation, admit a direct infection through the circulation (*Petrone, Kammerer, Horteloup, Sonnenburg, Hartley*). Others, who have observed in the articular exudation the absence of gonococci and the presence of other pyogenic germs (*Kraske, Brieger, Ehrlich, Haslund, Bornemann*) believe in a *secondary* or *mixed infection* (*Gerhardt, A. Fränkel, Bumm, Audry*). Finally, others, like *Bockhart*, admit both views.

The theory of the reflex origin of gonorrhœal rheumatism is contradicted by the fact of the existence of this affection in cases where the absence of urethral gonorrhœa was certain, as in cases of primary gonorrhœal ophthalmia (*Lucas*), and in the cases of *Poncet* and *Galezowski*, who cured trachoma of the conjunctiva by injecting gonorrhœal pus. The theory of the reflex origin of this affection, like the hypothesis already alluded to, tends to exclude the specific character of gonorrhœal rheumatism. The hypothesis of direct infection of the joints by *Neisser's* gonococcus, otherwise called the hypothesis of a well-characterized genuine metastasis, cannot be sustained in face of the numerous negative facts—absence of gonococci in the articular exudation—reported by conscientious and reliable observers. We have personally very carefully sought for gonococci in the articular fluid of a dozen cases, and, with the exception of a doubtful case, we have not found the specific micro-organisms, but common pyogenic micrococci were present. We should be tempted to adopt the theory of mixed infection, if this theory, as *Finger* also remarks, did not exclude the specific nature of gonorrhœal rheumatism, for it is difficult to understand in these cases why traumatic catarrhal infectious processes, having nothing in common with gonorrhœa,

should not also lead to similar arthritic conditions. We place this affection, in spite of the local character of the primary disease, on a parallel with scarlatinal arthritis, and admit with *Loeb* and *Bumm* that it arises from the lesions of the genito-urinary mucous membrane produced by the gonorrhœal process, principally in the shape of erosions and ulcerations of the posterior part of the urethra. But we consider the poison, which originates from the gonococci, as *specific;* it circulates in a dissolved form in the blood, and leads to inflammation of the articular membranes, perhaps in partnership with pyogenic micro-organisms. This conception resembles the hypothesis on the special modifications of scarlatinal poison, in being able to cause inflammation of the kidneys, and even of the joints. Regarding the mode of transformation of the contagion into a poison with a special affinity for the tissues of synovial membranes we can give no opinion.

Gonorrhœal rheumatism is a relatively rare affection. It attacks, according to *Grisolle*, *Fournier*, *Besnier*, and *Jullien*, 2 to 3 per cent. of all persons suffering from gonorrhœa. According to our personal experience, the number of cases of arthritis of gonorrhœal origin is at least 10 per cent. of all the cases of general articular rheumatism; but we are convinced that a great number of cases are looked upon as cases of ordinary arthritis, either on account of the lasting of the primary affection, or from dissimulation on the part of the patients, who, especially in the case of women, try to conceal gonorrhœa. It is very probable that predominance of the affection in the male sex (out of 271 cases in the general hospital in Copenhagen, *Bornemann* observed 229 males and 42 females) is only relative, and is to be explained by the greater frequency of urethral gonorrhœa in the male.

The affection frequently begins suddenly with fever, pains, swelling in the joints, usually in connection with the propagation of the gonorrhœal process to the posterior part of the urethra, three weeks after the infection. That the pains are moderate, as generally contended, we ourselves have never noticed. Frequently the knee-joint is affected, according to *Jullien* in more than a third, according to other authors in three-fourths of the cases. Then follow the ankle, wrist, elbow, and shoulder joints, then the fingers and toes, and also the feet. The amount of fluid varies; it is usually slightly turbid or genuinely purulent, as *Loeb* and *Haslund* have observed.

We cannot agree with *Nolen* in entirely assimilating the clinical evolution of this affection to that of ordinary rheumatism, but it is useless to insist on the minutiæ of differential diagnosis, considerably exaggerated by *Loeb*, and others. In the majority of cases, but not in all, certain characteristic signs are present. The specific process has a tendency to attack *one* joint only, or at most a few. It becomes localized, and does not leave one joint to attack another. The condition usually recurs with repeated attacks of

gonorrhœa. *W. Müller* observed a patient who had had gonorrhœa three times, and on each occasion he had suffered from arthritis on the seventh day. *Basset* observed an individual attacked five times consecutively in the same way. Inflammatory complications of the eyes are relatively benign in their course; they are more frequent in gonorrhœal than in ordinary rheumatism. Cardiac complications, on the contrary, are exceedingly rare, especially "gonorrhœal endocarditis" (*Marty, Derignac, Wille, Desnos, Pfuhl, Morel, Weichselbaum*, and others), which we have only observed in some quite isolated cases, consequently much more rarely than in scarlatinal rheumatism. *Gerhardt* has also called attention to this fact. Nevertheless, the cardiac affection is sometimes observed without arthritis (v. d. *Velden*). Pericarditis is exceedingly rare. Fever is usually not so high and lasts a shorter time, although, like *Fränkel* and others, we have seen cases in which the temperature was very high and the febrile period of exceptional duration. We do not admit that a long duration—*Nolen* calculates an average of two months, *Bornemann* of sixty-eight days—belongs more specially to gonorrhœal rheumatism than to ordinary polyarthritis. We do not believe either in the subacute or chronic evolution of the gonorrhœal form, in its frequent complications with inflammations of tendon sheaths and bursæ (to which *Terrillon* attaches so much importance), nor in the absolute resistance of the affection to treatment with salicylic acid. In a word, the two processes certainly offer certain clinical differences, but a fundamental divergence does not exist.

We have already said that localizations to the periosteum (*Nivet* observed very marked periostitis) and to the nerve tracts (gonorrhœal sciatica) are rare. We will only add that *Hayem* and *Parmentier* have latterly spoken of "spinal manifestations of gonorrhœal infection" (lancinating pains, feeling of constriction, painful spinal conditions, paræsthesia, hyperæsthesia, debility, increased tendon reflexes, tumour, muscular spasms). Possibly gonorrhœal neurasthenia (spinal irritation) or complications (myelo-meningitis, syphilis, etc.) play a part in these manifestations.

The *course* of gonorrhœal rheumatism is acute or chronic. Even when the evolution is febrile the fever rarely lasts more than a week or a fortnight, and in favourable cases the patient is usually cured in a month. The less the arthritis commences in an acute and precocious manner, the longer its course. As we have already observed, the inflammation has a tendency to become localized, and does not go from one joint to the other. It must not be forgotten, as *Lesser* very rightly remarks, that a person suffering from gonorrhœa may occasionally get genuine acute rheumatism. A careful examination should be made, according to *Schuster's* advice, to see whether the articular affection is not due to syphilis.

During the joint affection the urethral discharge diminishes, or even disappears completely (*Struppi*). This authority only admits of rheumatism as a complication of gonorrhœa when the process has passed the compressor urethræ. This rule is, however, not without exceptions. In the cases where gonorrhœal rheumatism is cured, recurrence is certain in cases of new infection (*Struppi*).

Prognosis.—The prognosis is usually favourable, but the joints remain impaired, and a relapse may occur without new infection. Chronic hydrarthrosis and ankylosis as sequelæ are rare, as is also extensive suppuration of the joint (*Haslund*, *König*), with rupture, pyæmic symptoms, and even death. Endocarditis is always a serious complication. In a case published by *Schedler*, death from ulcerative endocarditis occurred about a year after infection.

Treatment.—The treatment is the same as that of ordinary arthritis. We do not believe in an efficacious prophylaxis, such as the aseptic bandages recommended by *Bornemann*. We have already said that salicylate of soda must not be despised in all cases. *Fränkel* also insists on the value of this drug. We do not, however, agree with *Gerhardt*, when he says that the drug acts very rapidly in these cases; we find that its action is notably less reliable than in rheumatic polyarthritis. Antipyrin and acetanilide are less efficacious than salicylic acid. The treatment of purulent inflammatory conditions belongs to surgery. If aspiration shows suppuration, we send the patient to the surgical wards.

CONDYLOMATA ACUMINATA.

Moist Warts, Fig Warts, Papillomata.

Amongst the divers *causes* which may produce the development of warts, *urethral gonorrhœa* is one of the chief ones. To make the development of these productions depend on local irritation by decomposed secretions containing seborrhœic products is not very exact, for experience has proved that vegetations do not arise spontaneously in dirty patients, and that gonorrhœal patients of excessively dirty habits are frequently spared, so that one is finally disposed to admit a particular individual predisposition.

Next to gonorrhœa, these warts are met with in *balanitis*, soft and hard chancre, and moist syphilitic papules. In some cases we have seen the base entirely formed of a broad condyloma. Finally, cases exist in which ætiological factors remain, in spite of all investigations, absolutely obscure. Pregnancy usually hastens the development of warts.

The *transmissibility* of these lesions, mentioned by *Cowper*, has been latterly defended by *Kranz*, who has been able, by the transplantation of freshly excised warts to erosions of the prepuce and the large and small labia, to produce on these parts the

development of similar excrescences. Nevertheless, *Bumm* found the individual predisposition combined with chronic or mechanical irritation sufficient to explain the production of these vegetations, and he has never been able to obtain positive results by the inoculation of the gonorrhœal pus or pure cultures of gonococci, or by contact. *Unkowski* states he has discovered a special micro-organism, and he believes he has proved its specificity by positive inoculation. These facts do not appear to us to be reliable.

In men they are composed of proliferated papillæ, with smaller or greater implication of the epidermis. They are seated on the corona glandis and the prepuce, where by compression they take the classical form of cock's combs (French, *crêtes de coq*). In the female they are met with in all parts of the vulva and vestibule. In some cases they form large tumours, which often cause dysuria when seated in the region of the urethral orifice. In both sexes the vegetations may extend to the perinæum, the thigh and anus. As they occupy a tolerably extensive area, they may be numbered by hundreds, and their existence is betrayed at a considerable distance by the fœtid odour proceeding from the patient. In regions where the vegetations can develop freely, they take very varied forms, resembling strawberries, raspberries, and cauliflowers, hence the confusion with epitheliomata. Through mutual agglomeration these vegetations resemble thyme in blossom ("akrothymion" of the ancients). After constant contact with liquid secretions, the excrescences become soft and red, and of a granular form; otherwise they remain dry, whitish, and even horny.

The *Symptoms* which they cause depend on their position. Besides difficulties of micturition and defæcation, impossibility of cohabiting, etc., painful inflammation sometimes occurs, after which the excrescences may even become gangrenous. In these conditions a horrible fœtor is often noticed.

PROGNOSIS.—From a prognostic point of view, it must be remembered that warts possess powers of reproduction met with in no other neoplasm. In reality, it is a struggle against a veritable Hydra. Sometimes we have been obliged to cauterize and excise for months before they could be got rid of.

TREATMENT.—The treatment of warts is purely local. If they are numerous, not extensive, and with a *broad* basis, *Hebra's* classical powder should first be tried (summitat. sabin. pulv., alumin. pulv., aa.). By the daily application of a thick layer of this powder on the vegetations, in the majority of cases they can be got rid of. The small ulcerations which remain after their removal usually rapidly heal. In other cases they can be destroyed with liquor ferri perchlorid. (*Lesser*), ferr. sulfur. exsiccat. (*A. Müller*), arsenious acid (*Zeissl*), "plumbum causticum" made of oxide of lead and caustic potash (*Gerhardt, Bockhart*),

chromic acid, etc. We avoid enumerating other substances employed more or less empirically. None of these remedies prevent relapses. Some of them, especially strong caustics, produce extensive inflammatory œdema, and even gangrene.

Pedunculated and particularly extensive warty growths should be removed with a part of the healthy base with *Cowper's* scissors. The surface must be touched with liquor ferri. In spite of this, vegetations may appear later on, which we then destroy with the thermo-cautery. *Enormous* growths with a *very broad base* are excised with the knife, and the wound treated according to surgical rules. In a case of this kind affecting the labia, the anus, the perinæum, and the anal region, which resisted washings, powders, and caustics, and developed itself more and more, we were obliged to extirpate the greatest part of the tumour, including the cortex, with the knife. The remains disappeared in the course of a few weeks under the influence of naphthalin, leaving no traces. Nevertheless, repetition of the procedure has not given good results.

In some cases, continuous *cold* compresses were more efficacious than cauterization and excision (*Zeissl, Peters*).

NON-SPECIFIC CATARRH OF THE URETHRA.

PATHOGENESIS.—The *causes* of this affection, more imaginary than real, are very numerous. Above all must be mentioned the various injuries inflicted on the urethra by instruments, such as catheters, bougies, and the endoscope. Then follow irritating injections, wounds caused by concretions and various foreign bodies; finally, extension of inflammation from the bladder and prostate, irritations of the mucous membrane by ammoniacal urine; connection with a woman suffering from leucorrhœa, or during her menstrual period ("urethrorrhœa" of *Diday* and *Robinson*), is much more rarely the cause. According to *Bockhart's* recent communications, a "pseudo-gonorrhœal" and benign urethritis exists (sometimes complicated with epididymitis), as a sequel of infection by the schizomycetes contained in the vaginal secretion, and cultivated and inoculated with the same positive results—amongst others, small staphylo- and ovoid strepto-cocci. We have in vain sought for those non-gonorrhœal urethral discharges observed by *Bockhart* in 15 cases.

We cannot agree with *Ultzmann* that masturbation may lead to urethritis in the male. Nevertheless, a slight urethritis may sometimes complicate the simple catarrhal vulvo-vaginitis in children, and perhaps masturbation plays in these cases a certain part (*Parvin* and others).

SYMPTOMS.—They are very simple: slight disturbances reminding one a little of acute gonorrhœa, mucous discharge (which in these cases exists in the urine in the form of filaments),

or sometimes genuine purulent discharge. In a case observed by us, a *profuse* gonorrhœa, which disappeared the following day, developed after a "prophylactic" injection of a strong solution of permanganate of potassium. *Bockhart's* patients were all cured in at most twelve days.

The DIAGNOSIS depends principally on the history (often concealed by the patients) and on the course of the affection. Apart from the rare lingering cases, resulting from the permanent action of ætiological causes, the affection is generally cured in two days. If under the influence of expectant treatment the affection does not improve, we then look upon it as gonorrhœal, and we are nearly always right. If necessary, gonococci must be looked for.

From what we have said, the TREATMENT is obvious. Injections are, if possible, to be avoided.

URETHRORRHŒA EX LIBIDINE.

We cannot avoid devoting a few words to this so often recognised condition, which does not really belong to pathology, but is important, from a practical point of view, for the differential diagnosis of urethral discharges. Under this designation we understand the emission from the urethra, under the influence of sexual excesses, of a colourless, clear, stringy, odourless product, resembling *the white of egg*. It often shows itself in perfectly healthy and vigorous individuals during prolonged erections, in excitable individuals when giving way to sensual thoughts. The liquid never appears when the penis is relaxed, as ejected with cessation of the erection. More than a few drops never appear. Under the microscope epithelial and some round cells are found, but no spermatozoa. In the urine the discharge is in the form of transparent colloid products.

Contrary to the opinion of *Pitha*, *Zeissl*, and *Ultzmann*, which, however, also needs a basis, we have succeeded in proving that it *has nothing whatever to do with the prostate* (compare prostatitis). It is much more probable that the liquid, as *Guerlain*, *Robin*, *Curschmann*, and *Klein* suppose, is a secretion of *Cowper's* glands, with perhaps implication of *Littré's* glands. The bodies of these glands are considerably compressed during erection into the parts situated between the vessels of the corpora cavernosa.

"Patients" suffering from this affection believe it to be spermatorrhœa or gonorrhœa, and are treated as such by inexperienced, and indifferent physicians, especially when the history reveals former gonorrhœal infection. We do not deny that persons suffering from gonorrhœa have a certain predisposition for this affection, and must not omit to mention that, during the course of different inflammations of the urethra, discharges clinically very difficult to distinguish from the "sensual drop" are sometimes observed. In these cases the discharge has nothing to

do with erection, and is rather produced by a condition of a catarrhal nature. This affection is only of importance when it contains cellular elements in considerable quantity, for in these cases genuine urethrorrhœa, with formation of gonorrhœal filaments, is to be feared.

The TREATMENT consists in assuring the patient that the affection is harmless, but obstinate, and of a physiological nature. The diagnosis must never be made without the aid of the microscope.

STRICTURE OF THE URETHRA.

STRICTURA URETHRÆ, RÉTRÉCISSEMENT DE L'URÈTHRE.

This condition rightly occupies an important place in text-books of surgery. It is our intention to give here a short description of it, firstly, because cases of this kind often come under the observation of physicians, and, secondly, because the disease is a direct *consequence* of gonorrhœa, and completes it from a clinical point of view.

ÆTIOLOGY AND PATHOGENESIS.—Stricture of the urethra may be produced—

1. By *contraction* of the muscles of the urethra (see next section).

2. By *inflammatory* swelling of the mucous membrane. The most frequent forms of this class are produced by *gonorrhœa*, by injuries (which include at the same time the operations performed in the neighbourhood of the urethra, and followed by inflammation), and by lesions produced by rough, awkward, and perhaps too frequent catheterism.

3. By establishing *permanent anatomical modifications in the structure of the tissues.* They occur in cases of new growths, polypus and cancer, as a sequel to *proliferations of the idioplastic connective tissue* (*Dittel*) (" callous contraction "), *atrophy*, *cicatricial retraction* (" atrophic contraction "), often after gonorrhœal inflammation (in 90 per cent. of the cases according to *Weisse's* recent statistics). This class includes the important group of permanent organic strictures. We have already indicated the connection which exists between this process and chronic gonorrhœal urethritis. Some patients suffering from gonorrhœa owe their stricture less to the direct consequences of a specific inflammation than to rough and ignorant manipulation. Nevertheless, it must be admitted that the influence of the latter on the production of stricture is considerably exaggerated.

In a case published by *Picard*, the stricture occurred through the fault of the surgeon, who dipped the catheter in carbolic acid instead of oil. Traumatic forms are not frequent.

The " soft strictures " studied by *Auspitz* are due to the spongy proliferation of the mucous membrane. They sometimes

become callous strictures by the subsequent formation of cicatrices, and may be placed between the strictures of the second and third category.

PATHOLOGICAL ANATOMY.—*Organic* stricture (two or more rarely occur) is most frequently met with in the anterior part of the bulbo-membranous portion of the urethra. Then follow in order of frequency: strictures of the spongy part situated behind the fossa navicularis. *Thompson* found the pars pendula affected in 33 per cent. of the cases, the anterior part of the pars membranacea and the region of the bulbus in 67 per cent. *Weisse* found that in 90 per cent. of the cases the contraction had its seat in that portion of the urethra situated in front of the triangular ligament. The prostatic portion is rarely the seat of stricture. All degrees are met with between diffuse annular, nodular, cicatricial formations, and valvular, polypous, carunculous formations, etc. We abstain from giving here the detailed description found in the books on surgery, and we refer our readers for the histological and microscopic details to *Dittel's* excellent monograph, and to *Neelsen's* and *Oberländer's* anatomical and endoscopic studies.

SYMPTOMS AND DIAGNOSIS.—The disease is usually insidious in its development, and frequently it is only noticed by the patient when the stricture is already very marked, *i.e.*, sometimes ten years after the first gonorrhœal infection. The patients usually complain of *difficulties of micturition* and of *ejaculation.*

The stream of urine is usually very narrow, dispersed, and short. Nevertheless, *Dittel* has proved that the flow can keep its normal volume, and marked stricture may, notwithstanding this, be present. We cannot do better than refer to the latter author's important diagnostic principles on the alterations of the stream-flow produced by stricture, in his own words: "If the stream of urine be tolerably large, but not parabolic, and falls vertically, the stricture is wide and is seated posteriorly. If the urine flows drop by drop the stricture is narrow and seated posteriorly. If the patient feels a sensation of pressure on the perinæum during micturition, or if spontaneous discharge of the urine takes place drop by drop, a dilatation exists between the strictures, forming as it were a reservoir in which the urine remains stagnant. If the flow be narrow, and the urine flow rapidly, forming a sharp curve, the stricture is narrow, fairly extensive, and is seated anteriorly. If the stream be rapid and dispersed, then it is situated anteriorly and is small. If the stream be divided so that one portion be projected forward, and the other flow downward drop by drop, the lumen is not central."

In order to empty the bladder, the patients assume the most varied positions, press the penis, strain the abdomen, in order to facilitate the emptying of the bladder, and are often surprised that involuntary defæcation occurs. Compensatory hypertrophy

of the muscles of the bladder is not capable of preventing stagnation of the residual urine. The greater the quantity of urine remaining in the bladder, the more frequent and painful is the desire to micturate, and the pains are frequently aggravated by cystitis, a frequent consequence of catheterism. The urine accumulates very frequently behind the stricture—and the dilatation of this portion of the channel often leads to paralysis of the sphincter—and flows drop by drop after the act of micturition. Incontinence of urine of this nature generally disappears after the first time the catheter is used to dilate the stricture. Usually the urine, sometimes clear, sometimes turbid, contains *urethral filaments*, the products of inflammation of the urethral mucous membrane, chiefly of that portion situated behind the stricture. The exacerbations of this inflammation sometimes lead to symptoms of acute gonorrhœa. A very serious, and often unexpected, symptom is sudden and complete *retention* of urine. This depends less on the degree of stricture, *i.e.*, on the degree of its permeability, than on a reflex spasm of the sphincter, a fact proved, as *Delefosse* remarks, by the absence of urine in the portion of the urethra behind the stricture. *Otis* has shown that even relatively slight mechanical obstacles to the passage of urine may lead to retention from atony of the fundus of the bladder. *Stagnation* of urine in the posterior portion of the urethra not only produces dilatation of this part, but also of the excretory ducts of the prostate, of the ductus ejaculatorii, and of the various sinuses in which catheter and sound so easily get caught or fixed. Stagnation of urine favours extension of the inflammation to the bladder, the excretory ducts, and even to the prostrate and testes, leading to ammoniacal decomposition of the urine. In these conditions it is not rare to observe characteristic symptoms of cystitis, pyelocystitis, and prostatitis, etc., appear. In very marked cases, dilatation of the portion of the urethra situated behind the stricture may appear in the form of a fluctuating tumour on the perinæum, the old so-called "urinous abscess."

In certain cases, *inflammation* of the hyperplastic tissue in the region of the stricture sometimes occurs with a very decided tendency to involve the adjacent parts. This is accompanied by severe pains, with feverish symptoms. If a peri-urethral abscess forms, its breaking down is usually followed by the formation of urethral fistulæ.

For the same reasons, *ejaculation* is incomplete, and may be accompanied by such pains that the patients prefer to abstain from sexual connection altogether. These pains, which may be compared to the sensation of a red-hot iron being drawn through the urethra, are produced less by the accumulation of the semen, which often falls back into the bladder, than by inflammation and hyperæsthesia of the urethral mucous membrane and the parts

attacked by stricture. According to *Dittel*, the mixed sensation of pain and voluptuousness is often the first symptom of commencing stricture.

The efforts made by the bladder to conquer the mechanical obstacle, the extension of urinary stagnation from the urethra to the bladder, sufficiently explain the mechanism of the excentric and concentric *vesical hypertrophy*, and that of the *formation* of *diverticula*, conditions which arise when the stricture has been present for some time. *Simple dilatation* of the bladder, with atony of the detrusor, is less frequently observed. It is much more dangerous than hypertrophy. If a weakness of the sphincter exists at the same time, the symptoms of *ischuria paradoxa* are frequently observed.

Rupture of the bladder, with fatal peritonitis or infiltration of urine, is only observed when other serious complications exist (interstitial cystitis, ulcerative tuberculous lesions, etc.).

We have already discussed the dangers of inflammation extending to the pelvis of the kidney, and to the kidney itself (see "Pyelitis" and "Pyelonephritis"). In these not uncommon cases, so-called "harmless" gonorrhœa may be followed by suppurative nephritis, with pyæmia and uræmia.

On the other hand, the life of the patient is sometimes literally poisoned by hypochondria and melancholia. Stricture of the urethra and its consequences is not one of the most uncommon causes of suicide.

None of these symptoms alone, important as they are when found together, proves the *diagnosis* to be organic stricture of the urethra.

An *instrumental examination* of the urethra is absolutely necessary, and should, on account of the frequent latent stricture, never be omitted.

In some cases the diseased parts can be felt externally, either in the shape of indurations (callous strictures) or as a shortening of the urethra (atrophic contraction).

Exploratory catheterism should be practised with solid bougies or metal sounds, sometimes with an olive end. We recommend beginners to use for this examination one of *Nélaton's* fairly large sounds; if it passes easily, the patient may be left alone. A probe of the diameter of the normal urethra, No. 9 (5·5 mm.) English, or No. 17 (5·7 mm.) French, should always be used first, one of the size immediately below being used next, and so on. Inexperienced practitioners often make a mistake and diagnose a stricture when the instrument is caught in folds of the mucous membrane, or in the excretory ducts. Stricture may be mistaken for spasmodic contraction. With a little experience it is possible to feel the degree of stricture on withdrawal of the sound, and its length and situation can be estimated. The possibility of multiple strictures must be always borne in mind. For more

exact examination wax sounds (*Ducamp*), which preserve the shape of the stricture, or the endoscope, should be used. Strictures which do not allow of the passage of the smallest bougie, and are complicated with retention of urine, are called impermeable.

It must be remembered that if a stricture is diagnosed, it may be due to a neoplasm. We have often seen patients supposed to suffer from stricture of the urethra, who were in reality suffering from cancer of the prostate. *Paul* has observed in a case of gonorrhœal stricture a carcinoma develop in the walls of a perinæal abscess.

PROGNOSIS.—With regard to prognosis, a certain reserve must be observed. An early diagnosis followed by rational treatment is all the more favourable. Spontaneous cures are exceedingly rare, and cannot be taken into consideration. In the majority of cases the stricture becomes more and more marked when left to follow its own course. Even when the stricture is dilated, the patient is obliged all his life to pay attention to the condition of his urethra, and from time to time to use the catheter. Well-developed strictures are very obstinate to treat, and they may be looked upon as very serious and dangerous. We have already referred to their dangers. False passages constitute one of the most painful complications.

On the other hand, recent strictures, in the stage of tumefaction without complication, may be rapidly and permanently cured.

TREATMENT.—*Inflammatory* and soft strictures require rest in the first place, then abstinence from all excesses, local applications of cold (hip-baths). For the healing of erosions which may occur, it is sufficient to introduce large soft bougies, well rubbed with astringent ointment, or even urethral suppositories may be inserted by means of the porte-remède.

The treatment of *organic* stricture varies very much. "The tighter and older the stricture, the more energetic must be the treatment" (*Güterbock*).

The most simple and the least dangerous method consists, when there are no special contra-indications, in *progressive dilatation* with metal or rubber, but fairly hard, bougies, slightly conical, and almost cylindrical at the end, as recommended by *Guyon*. We agree with him that metal instruments should only be used when the rubber ones have failed, or as a security for the definite result. *Dittel's* objection that rubber bougies find their own way through the stricture more easily, and thus cannot be so well conducted by the hands, holds good in certain cases. With *Lesser*, we warn our readers against inexperienced use of exploratory catheterism with metal, especially tin, sounds, with which false passages are easily produced, and, with *Casper*, we disapprove of French bougies with a pointed conical end. *Weisse* rightly recommends short instruments, which cannot penetrate into the bladder.

Antisepsis is a necessity even when the urine presents no sign of decomposition. Sounds which correspond exactly with the lumen of the strictured part should be used first, and the size gradually increased. Patience, perseverance, and gentleness, as *Dittel* long ago observed, triumph over difficulties which resist violence and haste. We leave the bougies in every day for a quarter of an hour to an hour, and use a larger size every two to four days, so that after three to six weeks we use the ordinary sizes, and one to two weeks later the 7 mm. size (No. 12 English, No. 21 *Charrière*). From this time on the last-mentioned size should be used, but with less and less frequency. This method has always given very satisfactory results, but we admit that the same results may also be obtained by other methods. Complications with spasmodic strictures are frequent, especially when one changes the number of the instrument, and time and patience are necessary to overcome it to avoid the risk of causing other serious complications. The appearance of urethritis has no special significance. Even slight pyrexia in impressionable patients should not call for interruption of the treatment. Cocainization of the urethra (caution!) is often of great service.

The results are much more rapid with *continuous dilatation* (*Thompson*) when the instrument remains for days in the urethra, and the calibre of the bougie is increased several sizes; but this method sometimes produces serious complications, such as intense intermittent "urethral fever" ("catheter," "urinary fever"). Details of its nature, symptoms, and connection with the absorption of urinary poisons, renal complications, etc, can be found in text-books on surgery.

If on account of the small size of the stricture and its peculiar situation the bougie cannot be introduced, recourse may be had to the method indicated by *Béniqué* and *Zeissl* senior, which consists in introducing several filiform bougies at the same time, one of which finds the opening of the stricture and enters it. By means of a screw, bougies of larger calibre may also be fixed to these fine bougies (conical metal sounds, etc.), or from the commencement an instrument may be used, the filiform end of which curls up in the bladder, while the portion passed through the stricture increases in size (*Hunter*, *Maisonneuve*, *le Fort Posner*, and others).

The proposal recently made by *Güterbock* to replace the catheter à demeure by bougies à demeure (alongside of which the urine trickles away) deserves to be taken into consideration in cases of severe stricture in persons who suffer from special sensibility of the urethra. *Distin-Maddick* uses a "sonde à pierre" with a conductor.

Want of success, or the impossibility of a methodical cure, indicates the necessity of trying another method, and one which belongs to surgery. We will content ourselves with remarking

that "divulsion," which was a short time ago much in vogue in other countries, and "forced catheterism," are actually condemned by the best and most conscientious surgeons (*Stokes*, *Watson*, *Antal*, *Posner*, and others) as rough and dangerous methods. *Lefort's* "dilatation immédiate progressive" (introduction of conical metal bougies so as to widen the urethra to its normal size in *one* sitting), reminds one, according to *Güterbock*, too much of forced catheterism, and is objected to by *Delefosse*. On the other hand, internal urethrotomy, practised by *Guyon* and *Thompson* in more than 1,000 cases, and which is practically without danger (mortality 1 per cent. to 2 per cent.), sometimes gives good results. It is indicated when the stricture shows a manifest tendency to relapse, and is resilient—*i.e.*, contracted, especially near the *external orifice*. In these cases of contractility the patient is exceedingly sensitive to catheterism. We have seen neurasthenic patients scream at the first attempt to insert the catheter, be seized with rigor, and faint. *Thompson* rightly warns against delaying the operation, which, when the case has once become complicated with renal affection, cannot prolong the life of the patient. Other authorities recommend *external urethrotomy* (*Antal*, *Watson*, *Braun*, *Güterbock*, and *Bangs*), and employ it in a great number of cases. The first-named authority uses internal urethrotomy in valvular, annular, and atrophic contractions, and external urethrotomy in hyperplastic forms, complicated with infiltration and fistulæ, or when intra-urethral operations are not well borne.*

We are not of opinion that *massage* or *electrolysis* can give as good results as these methods, but it must be admitted that they may increase the efficacy of classical intervention. Electrolysis, which has again been used of late years in England and America, has been condemned by *Allen*, *Brown*, *Keyes*, as uncertain and dangerous (*Aley* mentions a fatal case). It has no advantages over the old-fashioned cauterization.

SPASM OF THE URETHRA.

Observations made by *Esmarch*, *H. Zeissl*, *Delefosse*, *Weil*, *Keyes*, and others, have proved that spasm of the urethra is a much more frequent affection than is generally supposed, and perhaps the most usual cause of retention of urine. We consider it necessary to study this condition, which is very frequently only an isolated symptom, more closely, and our study is justified by

* *Horrocks* (*Lancet*, vol. i., 1895) describes a case of traumatic stricture of the urethra in which he had cut down on and excised the stricture, uniting the divided ends of the urethra with sutures, and draining the bladder from the perinæum. The wound healed well, and the result was very satisfactory.

Hartmann has repeatedly treated stricture by means of the bougie à demeure, and found this treatment very successful.—W. H. G.

the fact that confusion with organic stricture of the urethra and other affections of the urinary passages is not rare, and has often caused deplorable consequences (lithotomy). *Esmarch* draws attention to a fact very important in the case of this affection, that *Guthrie's muscle*, situated in the region of the membranous portion (which by reason of its striated muscular fibres he terms "pars muscularis"), and the *constrictor isthmi urethræ* (*Müller*), close the urethra as a clamp does a rubber tube, and that *Guthrie's* muscle may become contracted as easily from the influence of will as by reflex action.

PATHOGENESIS.—The *causes* of urethral spasm are not without analogy with those of spasms of the *internal* sphincter of the bladder. It often appears as a reflex after intense irritation of the nerves of adjacent parts (sexual excess, operations in the region of the urethra, irritation of the intestinal mucous membrane), more frequently still after local lesions of the urethra caused by injections, catheterism, inflammation (especially gonorrhœa), ulcerations. Perhaps some of those conditions vulgarly called "chaude pisse" belong here. Psychical emotions, fear, hysteria, irritable weakness, also play a great part. We agree with *Keyes*, who considers the spasm of the urethra as a symptom of sexual neurasthenia, due to masturbation or to sexual excesses. An organic affection of the central nervous system is more rarely met with, and in this case it is caused more frequently by an incipient transverse myelitis.

We cannot insist too much on the frequency of combinations of spasm with inflammatory and organic strictures of the urethra.

The SYMPTOMS consist at first in a modification of the flow of urine, as in organic stricture. There is usually pain at the beginning and end of micturition, pain with various radiating phenomena already referred to. Complete retention of urine is rare, and usually produced by special causes (excess in food, cold, etc.). The urine itself is either normal or is of a varying or pyuric character when catarrh of the urinary organs exists. Resemblance to spasm of the bladder is a striking feature.

In cases of spasmodic strictures, which cannot remain limited to the membranous portion, a certain resistance is met with on introducing the catheter, "as if the catheter were not well oiled, and were passing through a too narrow indiarubber tube" (*Esmarch*). In patients suffering from spinal disease, we have seen the very finest *Nélaton* catheters arrested in the first portions of the urethra with such a force that the urethra would be torn rather than let the instrument pass. The intensity of the spasm varies very much individually. *Resistance disappears under anæsthetics.*

The TREATMENT must be especially directed, as in cases of spasm of the bladder, against the causes. In both cases antispasmodics, [illegible]ics, and warm local applications should be tried. The

same means may be employed when the spasm stops the catheter during catheterism. It is often sufficient to wait five or ten minutes, and the spasm ceases. Sometimes cold applications give good results.

Bardeleben, *Esmarch*, and *Zeissl* recommend, in cases of obstinate spasm, the introduction of two bougies, intended to modify the irritability of the mucous membrane. *Davenport* declares that he in this manner cured in one sitting a man who had been tormented ten years by "urethrismus." We have ourselves in some cases seen good results from this treatment, but in others the result was nil, or urethritis was produced.

Severe acute retention of urine, which does not yield to the above-mentioned methods, must be treated by catheterism, and it must not be postponed too long, to prevent atony of the bladder occurring (*Weil*).

In specially serious cases it may be a question of forced dilatation of the urethra, and of urethrotomy.

INFLAMMATION OF COWPER'S GLANDS.

The ETIOLOGICAL causes of this relatively rare and usually *unilateral* affection are irritation and inflammation of the urethra, especially *urethral gonorrhœa*, but not sexual excesses, as *Gubler* supposes. It is sometimes met with as a "metastatic" complication after typhoid fever, endocarditis, pneumonia (*Englisch*). In cases of gonorrhœa it usually appears three or four weeks after the infection (*Englisch*). It may, however, appear immediately or a year after specific inflammation.

Acute inflammation (follicular and interstitial) usually produces an *abscess*. This abscess, which is unilateral, very painful, and separated from the prostate by a sulcus, is observed as a tumour occupying the perinæum or the middle aponeurosis, and rendering micturition and defæcation difficult. The inflammation spreads sometimes to the periglandular connective tissue. In spite of *Mauriac's* doubts, perforation of the abscess into the perinæum, the urethra, and the rectum, with formation of slowly-healing fistulæ, even with serious urinary infiltrations, have certainly been observed (*Englisch*). The necessity of early incision cannot be too much insisted upon. The existence of obstinate fistulæ may sometimes necessitate total removal of the gland in order to obtain a radical cure (*Englisch*).

Chronic inflammation usually shows itself by the appearance of firm, fixed tumours, the size of a bean. They sometimes involve the adjacent parts of the urethral mucous membrane, but have no influence on the erection of the organ. We have sometimes found them quite by chance while examining patients for another disease.

Englisch rightly draws attention to the relationship existing between the chronic form of the condition and tuberculous peri-urethritis, in cases of acquired or hereditary tuberculosis.

DISEASES OF THE GENITAL ORGANS.

The diseases of the *prostate*, especially its important condition of hypertrophy, are referred to in text-books on surgery. The reasons which lead us to devote a small space to *inflammation* of the prostate are the same as those which decided us to discuss stricture of the urethra.

1. ACUTE PROSTATITIS.

This condition offers such marked clinical symptoms that we must separate it from the chronic forms.

ETIOLOGY.—Apart from the very rare "idiopathic" forms, and the pyæmic processes as partial symptoms (mostly produced by means of septic thrombosis), acute prostatitis is met with after injuries (false passages), and the propagation of inflammation from the *adjacent organs* by contiguity, after *catarrh of the bladder and the urethra*, when the process attacks the excretory ducts of the prostate. Amongst all these causes, the most important are *gonorrhœa* and *urethral stricture*, with or without excess in diet or in *baccho et venere*, physical over-exertion, cold, irritation from surgical manipulation. Some authors admit that in gonorrhœa of the posterior part of the urethra involvement of the prostate is very frequent, and, according to the statistics of *Montagnon* and *Eraud*, even exists in 70 per cent. of the cases. It is to be regretted that this assertion is not more clearly and more decisively put forward, for the symptoms referred to in favour of this theory may very well be attributed to inflammation limited to the prostatic part of the urethra only. It is not proved that the use of certain drugs, such as cantharides and cubebs, leads to this condition. The disease is most frequent in the middle-aged, is less frequently met with in old age, and is quite unknown in childhood.

Nothing certain is known as to its parasitic origin. Gonorrhœal forms are said to be produced by mixed infection (*Gerheim*). In secretions of the inflamed gland, the only micro-organisms which we have met with were large bacteria, partly united in long chains, and resembling anthrax bacilli, but we must add that we do not consider these micro-organisms as the cause of the condition.

We attribute but little importance to that very vague phenomenon, "congestion" of the prostate, and agree with *Segond* in distinguishing these stages. In the first there is catarrh of the

excretory ducts of the gland, which on pressure give issue to a more or less purulent secretion; the catarrh plays the principal part. In the second the glandular parenchyma appears riddled with small isolated abscesses; they commence in the follicles and interstitial tissue of the gland. Things may remain in this state, and not go further; in these cases a condition exists which is analogous to that constituting *Harrison's acute follicular prostatitis.* In other cases *large cavities* containing pus may be formed through coalescence of the multiple abscesses, with destruction of the glandular parenchyma. In such cases the gland may finally become a mere purulent cyst enclosed in the fibrous capsule. This is *Harrison's general parenchymatous prostatitis.* The small abscesses usually burst into the urethra, the rectum, the perinæum, and the ischio-rectal cavity. In other cases the abscesses perforate the capsule of the gland and form a *periprostatic abscess* in the loose cellular tissue round the rectum.

Such a periprostatic cellulitis sometimes arises primarily and without marked involvement of the gland (*Parmentier, Dubreuil*), and may perforate into the urethra, the rectum, the perinæum, etc.

The larger the abscess, the greater the subsequent deformity from scarring or induration.

Symptoms.—The principal symptoms are violent pain in the region of the perinæum, rightly referred to by the patient as inflammatory, painful dysuria, tenesmus recti, and sometimes even complete retention of urine and fæces. The patients lie with their legs stretched apart, as they are incapable of sitting, have high fever (the disease sometimes commences with a rigor), and anxiously avoid every movement, as it increases the pain, which affects the urethra, the rectum, the sacrum, and even the lower extremities.

Contraction of the muscles of the abdomen resulting from dysuria compresses the inflamed gland, which in its turn presses onto the urethra, and thus increases the pains occasioned by strangury. This "vicious circle" brings the patients, whose sufferings resemble those of persons with gallstones and stricture, to a state bordering on distraction. If a gonorrhœal discharge existed previously, it disappears from the moment the inflammation becomes manifest. It is sometimes replaced by a clear mucoviscid secretion (*Guerlain, Zeissl, Harrison*). Nevertheless, this hypersecretion must not be considered as of a prostatic origin. It is probably derived from the mucous glands of the urethra, in the region of the prostate, and irritated by the inflammation of the latter.

The perinæum is excessively sensitive to pressure. Digital exploration of the rectum is generally very painful, and allows the seat of the pains to be localized in the prostate, which is hot, sensitive, but not swollen in all cases. Such cases may become chronic, or may undergo complete involution. Suppuration,

however, is more frequent. In this latter case marked fever, often interrupted by rigor, is observed, proportionate to the extent of the suppuration. The most frequent and relatively most favourable perforation takes place into the urethra, seldom, however, occurring before the end of a week, and it is sometimes unintentionally caused by the catheter. All discomfort rapidly ceases, and often a perfect cure results. The contents of the abscess are found in the urine as purulent sediment. The other modes of perforation have special symptoms easily understood. Perforation into the abdominal cavity followed by fatal peritonitis is very seldom observed. The extension of the cellulitis into the tissue around the rectum often produces pyæmic symptoms.

Sometimes fistulæ (of the urethra, the rectum, the perinæum) ensue. Urinary infiltration is uncommon. *Zeissl* has observed a case of double perforation into the bladder and into the rectum, with formation of a recto-urethral fistula with a double passage of urine and flatus.

We have, like *Pitmann* and *Finger*, observed in some cases an insidious, almost latent, course of considerable glandular secretion, especially in old and indolent persons, and also in consumptives. In the latter it may sometimes have been genuine tuberculous prostatitis.

Abortive forms, characterized by the existence of small, circumscribed centres, are frequent, but their diagnosis is very difficult, for the same complex symptoms are also present in non-complicated posterior urethritis. Sensitiveness and strangury proceeding from pressure exercised on the gland from the rectum is without diagnostic value, for, contrary to what *Montagnon* maintains, the same fact is often observed in absolutely healthy persons free from all morbid conditions of the urinary organs, especially when they suffer from nervousness, and these sensations often last for hours.

Prognosis is simple after what has been said. Generalized suppurating prostatitis is always serious, but out of 114 cases of abscess of the prostate, *Segond* has observed 34 fatal cases, 10 cases of urinary fistulæ, and 70 cures.

Diagnosis is generally easy when the formation of an abscess is obvious, but it becomes difficult, and almost impossible, in the contrary case. *Zeissl* has drawn attention to the possibility of confusion with abscess in the ischio-rectal cavity, which presents an identical symptomatology. The unilateral position of the tumour, its more lateral seat, and the lesser intensity of the urinary troubles, are decisive.

Treatment.—The moment acute prostatitis appears, the treatment consists in absolute rest. All urethral injections must cease. The application of leeches to the perinæum and the anus (*Dittel, Socin, Thompson*) sometimes gives relief; it is, however, generally unnecessary, and *Fischer* condemns it entirely. Hot fomenta-

tions or hip-baths have a more soothing effect than local applications of cold, once the signs of suppuration have appeared. We have a rational method for the application of cold in *Arzberger's* hæmorrhoidal apparatus (a hollow metal instrument, in which cold water circulates, and which is introduced into the rectum) and its modifications (*Finger*); we have used an American model with a longer conus. Some patients cannot bear, even at the onset of the affection, the introduction of these instruments, and in such cases we must have recourse to the old cold compresses. Other authorities are in favour of lukewarm or warm irrigations. Constipation must be avoided, and, in spite of *Harrison's* warnings, we prescribe mild purgatives. In cases of unendurable pain, narcotics, in the form of suppositories or injected subcutaneously, may be given. In our opinion, carbonate of soda appears useless, the administration of alkaline waters and acid drinks in too large quantities may be very harmful, when there is threatened retention of urine. In cases where the latter occurs, the catheter must be used, and even the catheter à demeure (*Dittel*). If the tumour increases in size and extends towards the rectum, causing intense tenesmus, *König* recommends the incision of the sphincter ani so as to moderate the pain and to avoid the consecutive formation of fistulæ. As soon as the abscess is formed, the perinæum must be cut into, and an incision made into the tumour (*Segond*). This method, like opening the abscess after detachment of the anterior wall of the rectum (*Dittel**), is preferable to the incision of the rectum, and to perforation with a sound or probe introduced into the urethra.

Spontaneous external perforation into the rectum must be followed by frequent antiseptic irrigation. Fistulæ are treated according to special rules.

2. CHRONIC PROSTATITIS.

Whether it proceed from acute inflammation or is insidiously developed, chronic prostatitis is one of the least-known affections, in spite of a considerable number of works published on the subject. This is explained by the fact that chronic prostatitis does not directly endanger the life of the patient, so that the post-mortem investigation of this affection is somewhat left to chance.

As well as the forms described by *Guerlain*, which manifest themselves by *prostatorrhœa* (forms which recent experiences lead us to consider as parallel with *diffused nephritis*), and those which are characterized by chronic suppuration of the gland, other and

* *Otto Zuckerkandl*, like *Segond*, proves the identity of the pararectal incision in prostatic abscesses with *Dittel's* detachment of the rectal wall, and describes thirteen cases treated successfully by *Dittel* and himself.—W. H. G.

very variable one also. It is found most often only as the sequelæ that partial prostatectomy or such may demand to the excessive needs of the gland, is present, which does not give rise to an increase in the glandular secretion or to any special disturbance. On the other hand, the condition is often met with in chronic gonorrhœa and urethrorrhœa ex limitibus. In this chapter we have only a new chronic inflammation of the prostate, revealing itself by a prostatorrhœa, and not accompanied by the formation of a genuine abscess. It is not frequent; on the contrary, it is very uncommon, a fact essentially insisted on by *Bryan*. Many more patients suffer from chronic inflammation of the prostate than really suffer from it. We may add that the condition is erroneously diagnosed by physicians in cases where inflammation has not got beyond the mucous membrane of the posterior part of the urethra.

Posner has recently expressed quite an opposite view. He considers chronic and subacute prostatitis to be fairly frequently developed, principally after a catarrh of the excretory ducts of the gland in the posterior part of the urethra, and he considers them as an essential cause of serious neurasthenia. We mention these facts as coming from so competent an authority as *Posner*. Regarding an explanation of these different opinions from the point of view of the frequency of chronic prostatitis, we attribute it to the fact that *Posner* includes the cases in which catarrhal inflammation of the *excretory ducts* of the prostate existed, and such cases where excretions obtained by pressure of the prostate contain a large number of cylindrical epithelium cells and leucocytes.

Our remarks are chiefly based on the works of *Thompson*, *Guerrain*, *Socin* and *Bryan*, on *Gross's* contributions, and also on our own personal observation.

Etiology is in its essential parts the same as that of acute prostatitis. Gonorrhœa and stricture play the principal part. All the affections of the urinary passage, and especially those accompanied by ammoniacal decomposition of urine, may occasionally involve chronic prostatitis. Whether diffused, non-suppurated, glandular, "follicular," and "interfollicular" inflammation, or "aposthematic forms," with considerable destruction of the parenchyma, establish themselves, depends entirely on the nature of the pyogenic agents contained in the urethral secretions. Injuries, especially roughly treated cases, are also of some importance. After too frequent and unskilful catheterism, inflammation often accompanies hypertrophy of the gland in old men; hypertrophy of the prostate, however, rarely precedes prostatitis, although some authors consider this cause to be frequent. We will not discuss here the "metastatic" forms. We admit, by analogy with infectious nephritis, the existence of "hæmato-" inflammation of the prostate, *i.e.*, of prostatitis pro-

duced by micro-organisms and their toxic products circulating in the blood. In fact, *Hanau* has latterly found by direct examination as to the localization of the causes of suppuration in the prostate of a pyæmic patient, that the suppuration resulted from the invasion of micro-organisms from the blood or through the glandular epithelium. The condition sometimes appears as a symptom of gout, according to *Ebstein*, in the form of catarrh of the excretory ducts ("gouty gonorrhœa").

The PATHOLOGICAL ANATOMY of chronic prostatitis is not yet well established. The normal size of the gland is sometimes spoken of (when hypertrophy has not formerly existed); occasionally it is referred to as a partial or diffused swelling of the organ, or as soft, succulent, or, again, as presenting an indurated and discoloured surface on section. It has been contended that the most usual characteristic consists in infiltration of the walls of the excretory ducts, with dilatation of the latter and the pre-existing cavities in the glandular parenchyma. The existence of cystic cavities filled with thick glandular secretion, pus and concretions has also been mentioned. Thus, it can be seen that it is very difficult to form a precise opinion of the part played by the factors which give rise to the two principal processes: diffuse and suppurative inflammation. We do not mean the well-known anatomical characters of the classical forms of abscesses of the prostate, forms which all physicians who have conducted autopsies know, and which lead to phenomena reminding one in a striking manner of suppurative chronic nephritis (which, through the fact that tuberculosis is often associated, offers special characters) and of pyelonephritis. What at present interests us is to know up to what point the non-destroyed portion of the glandular parenchyma takes part in the process, and what is the relationship between suppuration and the condition of the normal glandular portion. Several years ago we expressed the opinion that the processes which occur in the prostate resemble those of nephritis, and our recent observations only confirm this view. We have twice found a diffuse (non-suppurative) prostatitis, essentially characterized by cloudy swelling of the glandular epithelium, by marked infiltration of the adjacent stroma with leucocytes, leading to atrophy and obliteration of the glandular elements, and to the formation of broad cicatrices; while in two cases of suppurative prostatitis, equally advanced, parenchymatous and interstitial modifications of the glandular substance were absent.

We cannot give an opinion as to the existence of mixed forms, but we consider it interesting to give the details of the autopsy of a case (prostatorrhœa in gonorrhœal stricture) which we carefully observed during the lifetime of the patient. In this case we found the gland scarcely enlarged, and riddled with broad, compact, ivory-coloured tracts of cicatricial connective tissue. The dilated walls of the excretory ducts were hyperplastic, and infiltrated

with small cells. The channels themselves were filled with a turbid mucous liquid, presenting under the microscope the elements found in prostatorrhœa; in the glandular tissue itself there were partial swellings and cloudiness of the epithelium, and centres of interstitial inflammation were also found, but no abscesses. Possibly the large cicatricial tracts were connected with old abscesses. Catarrh of the excretory ducts is seldom absent.

Rokitansky's "galactophorous prostate" ("milchende prostata") is due to very pronounced fatty metamorphosis of the glandular elements. As we shall see farther on, a normal prostate may also furnish a turbid milky secretion.

SYMPTOMS.—The material in our possession is not sufficient for us to discuss the two chief groups separately. According to *Guyon*, chronic prostatitis is frequently without symptoms. With the exception of those cases where there is a formation of extensive abscesses, the disturbances are little different from those of chronic gonorrhœa. There usually exists a sensation of pressure, weight, gnawing, boring, griping, weariness, and other paræsthesiæ, in the deeper parts of the perinæum, pricking and also painful sensations along the urethra, a slight degree of dysuria, disturbances in ejaculation, rendering sexual congress rather painful. But all these symptoms have no specific or pathognomonic importance. We warn our readers against attaching any diagnostic importance to these various subjective sensations, which may just as well point to chronic gonorrhœa in sensitive patients, and to other various morbid conditions (necrosis included) of the neck of the bladder and of its neighbourhood. The frequent co-existence of chronic gonorrhœa or stricture of the urethra renders the classification of the symptoms and their due apportioning to the original disease almost impossible, and it is difficult to distinguish what is caused by prostatitis and what may be attributed to complications. The depression and melancholy met with in patients attacked by chronic prostatitis is also observed in non-complicated chronic gonorrhœa. The cardinal symptoms of hypertrophy of the prostate, and especially serious chronic retention of urine and its consequences, do not properly belong to chronic prostatitis. In cases of complication with cystitis, special symptoms are naturally observed. For the suppurative forms, *Socin* admits the existence of a partial retention of urine by supposing that the abscesses in communication with the urethra are filled at each micturition with the urine, which then passes into a state of putrefaction. On the other hand, sudden ischuric attacks often occur. In two cases they proved very serious.

In cases where large portions of the gland gradually become involved in suppuration, decomposition of the contents of the abscess takes place. Septicæmic symptoms analogous to the sequelæ of renal suppuration may be observed. It other cases, especially when a tuberculous predisposition exists, tuberculosis

of the prostate and genital organs may develop, and the patients usually succumb to hectic fever, with or without tuberculosis of other organs.

Apart from these serious complications, the principal symptom of these forms of chronic prostatitis consists in *prostatorrhœa*. Only complete ignorance of the properties of normal secretions of the prostate can account for such a remarkable diversity of opinion regarding the fluid of prostatorrhœa as existed before the publication of our researches, even among the best authorities, and are still to be found in the works of many writers. We explained some time ago in our publications *why* most descriptions of prostatorrhœa were absolutely wrong and contrary to observation. It suffices here to say that whenever a "clear and transparent" urethral discharge is spoken of, the liquid in question does not proceed either from the *normal* or *inflamed* prostate, and that in these cases a confusion with the conditions named by us "urethrorrhœa ex libidine" exists.

The secretion of the normal prostate, as obtained by expression from the decorticated gland in the cadaver, and by digital pressure from the rectum in the living, is never "transparent and mucous," but "fluid and milky," the latter in consequence of the presence of innumerable small granules containing lecithin. (For details on the functions of the prostatic fluid see section on "Sterility.")

In reality, only one form of prostatorrhœa exists, that which consists principally in the discharge of *normal* prostatic fluid. We except that form of prostatorrhœa (the existence of which was wrongly doubted by *Robin*), and now turn our attention only to prostatorrhœa produced by prostatitis.

In this case the discharge is cloudy (it only becomes clear after the deposit of sediment), *thick*, mucous or muco-purulent, and resembles, from a macroscopic point of view, the secretion of chronic gonorrhœa. The quantity of fluid in prostatorrhœa is more considerable than in gonorrhœa (according to *Gross* and *Socin*, 10 grammes per diem), and the discharge is notably exaggerated by defæcation, as in spermatorrhœa (see the latter). The discharge increases during micturition. Prostatorrhœa may be continuous or intermittent, and in such cases, as *Zeissl* has proved (when "mucous catarrh" of the prostate corresponds to the form we are describing), we have to do with a temporary contraction of the muscular apparatus of the gland.

The gland is very sensitive to examination per rectum, nevertheless, the pain caused by the pressure is far from being as violent as in acute prostatitis. The gland is normal or slightly hypertrophied. Defæcation is difficult. Even when pressure is exercised on the gland, it causes a discharge of the prostatic fluid by the urethra. The liquid is identical with that which is sometimes spontaneously discharged.

Microscopic examination reveals, besides the former elements of pus, the granules already mentioned, molecules of fat and *yellow pigment.* Red blood corpuscles are often found, and in a series of cases, as very important elements, *stratified amyloid corpuscles* and remains of cylindrical *epithelial* cells. In cases where chronic gonorrhœa is also present, the characteristic elements of the gonorrhœal discharge are likewise observed.

In the *urine* the secretion appears as *urethral filaments.* Often after the first portion of urine has washed away the principal elements, filaments which probably come from the prostate itself are found in the second portion. Where no stricture is present, we have never observed the regurgitation of the secretion into the bladder.

Prognosis is, apart from suppuration of the gland and its consequences, *quoad vitam* favourable, *quoad valetudinem completam* very doubtful. If we consider chronic gonorrhœa as one of the most obstinate morbid conditions, this opinion holds good even to a greater extent, for chronic diffuse prostatitis, when all treatment is often of no avail, is troublesome and continuous. The discharge makes the patient depressed and melancholy, even if he have not previously suffered from neurasthenia. We have already indicated the dangers of the final complications. The complications excepted, the prognosis is favourable when the primary affection (strictures, vesical calculus) is accessible to treatment. But we do not agree with *Socin,* who believes that removal of the "most usual" cause of the affection, masturbation, leads to certain cure. Complicating tuberculosis considerably increases the bad prognosis.

Diagnosis.—The diagnosis of chronic inflammation of the prostate is difficult. It depends less on the numerous subjective sensations of the patient than on the results of digital exploration of the prostate through the empty rectum—but one must be very careful as to the positive interpretation of hypertrophy and sensibility of the gland—on the quantity and composition of the discharge and its connection with defæcation and on its microscopic character. The microscopic examination of the liquid obtained by strong pressure from the rectum on to the prostate must never be considered sufficient, for even in the case of a healthy prostate the fluid may be mixed with urethral secretions—for example, in simple chronic gonorrhœa—and be taken for that of prostatorrhœa. One must therefore examine the liquid which flows *spontaneously,* or that which one obtains by pressure on the prostate after the patient has passed urine and has thus cleared the urethra. We cannot insist too strongly on this precaution, especially when a stricture exists behind which a great quantity of secretion has accumulated, which is taken for prostatic fluid, and in reality arises from the dilated portion of the urethra, situated behind the stricture. If on pressure of the prostate from the rectum, *thin, milky* fluid appears at the urethral orifice—*i.e.*,

a normal prostatic fluid, without leucocytes—we may quite safely *exclude prostatitis*. We consider this procedure to be very important and useful for negative diagnosis.

In the microscopical examination, great importance must be attached to the presence of *numerous amyloid corpuscles* (Fig. 11), which unfortunately are as often absent as not. They are found in small quantities in simple gonorrhœa, as they also exist on the urethral mucous membrane. In the second place, our observations have shown us that the presence of *numerous*

FIG. 11.—URETHRAL SECRETION IN PROSTATORRHŒA AFTER ADDITION OF PHOSPHATE OF AMMONIUM (ROUND CELLS; EPITHELIA, AMYLOID CORPUSCLES; BÖTTCHER'S SPERMATIC CRYSTALS).

typical cylindrical epithelial cells is also in favour of prostatorrhœa. The arrangement of the glandular epithelium in two layers (cylindrical cells, the ends of which fit into a mosaic of small round epithelial cells) is characteristic for the prostate, and sometimes presents itself in the form of laciniæ of tubular membranes. This is very important, but only rarely exists. The presence of a large number of *pus corpuscles* indicates the existence of a catarrh of the excretory ducts of the gland, but cannot be considered as a proof of inflammation of the parenchyma. In all circumstances, the presence of *Böttcher's* large spermatic crystals decides the secretory participation of the

prostate. These crystals (Fig. 11) are acid phosphates, the composition of which was demonstrated several years ago by *Schreiner*, and which, according to our researches, is not contained in the genuine sperm or in the contents of the seminal vesicles, but in the *prostatic* fluid, and gives the characteristic odour to the spermatic secretion.

In order to demonstrate these crystals, a drop of the fluid obtained must be mixed with a drop of 1 per cent. solution of ammonium phosphate on a slide. At the end of an hour a considerable number of very beautiful large crystals are found (Fig. 11). In other cases it is necessary to let the preparation dry and to search for the crystals specially at the edges of the cover-glass. Unfortunately, these crystals may be wanting in genuine prostatorrhœa, sometimes as a consequence of important chemical changes in the product of secretion of the inflamed gland, sometimes in cases of purulent and gangrenous destruction of the parenchyma, and also in consequence of admixture with urine (see below). Their inconstancy, however, by no means deprives them of their diagnostic value.

Fairly frequently, but by no means always, *isolated spermatozoa* are found in the fluid of prostatorrhœa. They are either due to the accidental presence of the remains of a normal ejaculation (coitus, pollutions, masturbation)—such cases are easily recognised—or to a discharge from the ductus ejaculatorii after intense pressure, or to atonic conditions (*cf.* "Spermatorrhœa"). The presence of a large quantity of spermatozoa in the prostatic liquid, such as *Black* has latterly observed in a group of cases of prostatorrhœa, may only be interpreted as a sign of genuine *spermatorrhœa.*

Differential diagnosis is very difficult between prostatorrhœa and *azoospermatorrhœa, i.e.*, spermatorrhœa complicated with azoospermia (see the latter), when at the same time an inflammatory condition of the prostatic part of the urethra exists. We must admit that in several cases, in spite of the most attentive consideration of all the symptoms, we have only arrived at a probable diagnosis.

The *urine* must be very carefully tested. The first and the last portions passed must be received in two glasses, the remainder in a large vessel. The presence of "urethral filaments" in the first portion is as much an indication of gonorrhœa as of prostatorrhœa. That of numerous cylindrical epithelial cells or stratified amyloid corpuscles indicates prostatorrhœa. Sometimes, at the end of micturition, when the patient is making considerable efforts, a great quantity of prostatic liquid is passed. A certain quantity of this liquid, by pressure on the prostate, may then also be obtained, or even when the patient bears down. These cases are evident, and must never be confounded with a simple posterior gonorrhœa. The idea of finding *Böttcher's* crystals

in these cases must be given up, as their formation is prevented by contact *with urine*. For the same reasons no crystals are found in cases where the condition of the vesical sphincter permits a continual mixing of the prostatic fluid with the urine. *Paget* and *Clark* have latterly described peculiar bodies of the prostatic follicles in the form of hyaline cylinders with bottle-shaped ends. We ourselves have also seen these formations, which have led to the term "desquamative prostatitis" being used, and have also observed them in isolated cases of spermatorrhœa.

A negative diagnosis may sometimes be obtained by an examination of the *product of pollution*. If this latter contain no leucocytes indicating catarrh, it may be safely assumed that prostatitis does not exist, as prostatic fluid belongs to the products of seminal emission.

The examination (endoscopic when possible) of the *urethra* in cases where chronic gonorrhœa or stricture does not exist shows nothing characteristic, at most the discharge of a cloudy secretion from the prostatic passages.

Complications of the condition with severe urethral stricture, vesical catarrh, or ammoniacal decomposition of urine, may make the afore-mentioned diagnostic difficulties insuperable.

If genuine *abscesses of the prostate* develop, it is useless to look for prostatorrhœa. What is then discharged from the urethra is pus, or a mixture of pus and urine.

TREATMENT.—The treatment most to be recommended is that based on the etiology of the affection. As a rule, the treatment resembles that of chronic gonorrhœa, to which we refer the reader. It must be known that the usual injections of antiseptic, astringent, and caustic substances are ineffectual, and that it is absolutely necessary to inject all the various solutions, amongst which preparations of iodine (*Lugol's* solution) and nitrate of silver must be considered the best, directly into the prostatic part of the urethra. Even then it would appear probable that only the large dilated excretory ducts of the gland are reached, and that the *indicatio morbi* with regard to inflammation of the parenchyma cannot be fulfilled.

In cases of profuse prostatorrhœa, we recommend the gland to be first compressed from the rectum, and then a thorough irrigation of the posterior part of the urethra with an alkaline solution, in order to rid the passage of viscid secretions.

Socin recommends the introduction, by aid of *Garreau's sonde à piston*, of short suppositories of *lapis mitigatus*. *Terillon* is in favour of installations of the strongest solution of nitrate of silver. Spinal irritation usually prevents cauterization. In such cases a carefully-directed general treatment must be followed (see "Spermatorrhœa") Improvement of the symptoms of neurasthenia under the influence of irritating local applications is only

rarely observed, although the majority of patients demand energetic local treatment.

Posner has latterly laid special stress on the fact that, especially with neurasthenic patients suffering from prostatitis, the examination with the sound does more harm than the disease itself, and that by its omission many a pain and permanent injury may be avoided (*cf.* "Treatment of Spermatorrhœa").

Progressive dilatation of the urethra sometimes does good, even when cicatricial contraction does not exist. Rapid dilatation of the urethra, on the contrary, must never be allowed.

Our personal experience is not sufficient to give an opinion on *Heine's* parenchymatous injections of tincture of iodine, made through the rectum. They seem to be but little appreciated. Suppositories of iodide of potassium, introduced into the rectum, are less dangerous, and possibly equally efficacious.

In spite of *Thompson*, we must say that derivatives appear to us to have only a fleeting effect, and to be of only moderate usefulness. The same may be said of local applications of cold (hip-bath, psychrophore). The apparatus for the circulation of lukewarm water and ascending douches (*Fischer*) render good service in cases of recrudescence of the disease. The favourable action is not, however, of long duration.

For treatment of abscesses of the prostate we refer our readers to the section on acute prostatitis. Violent pain, fever, great sensitiveness of the gland on manipulation, and the existence of soft areas in the parenchyma, indicate suppuration. The abscesses, often formed after rough manipulations with sounds, catheters, bougies, porte-remèdes, injections, electrodes, etc., and which do not belong to diffuse prostatitis, contribute to increase the sufferings of the patients.

General disturbances of nutrition and intense mental depression are best met by the usual therapeutic measures. Severe dyspeptic conditions demand regulation of diet and warm baths. Purgatives are sometimes indispensable.

In a number of cases very good results are obtained by a course of waters. In other cases they are useless, so that precise indications on the nature of the baths is impossible. Mineral baths, hydrotherapeutics, salt baths, sulphur baths, sea-bathing, are prescribed, but somewhat promiscuously. Carlsbad is rather popular.*

Gross rightly insists on the advantage of *travelling*, but it must be remembered that it is contra-indicated with patients who are below par, and who suffer from serious febrile complications and require careful nursing. *Marriage* does not seem to us to be advisable, although we do not forbid such patients to have occasional sexual intercourse when chronic gonorrhœa does not exist. Excesses of all kinds must be avoided. Regarding

* Acqui, Gerace, Irno, Montecatini.—W. H. G.

alcoholic beverages, we refer to what we have said on this point in the section on chronic gonorrhœa.

INFLAMMATION OF THE SEMINAL VESICLES.

Spermatocystitis.

In spite of some fairly important works on the subject (*Humphrey, Pitha, Guelliot, Finger*, and others), this condition is even less known than prostatitis, and may, in its chronic form, only be diagnosed (as in a case of *Finger's*) when it is possible to feel the organs as hard lumps through the rectum. The affection is almost always of gonorrhœal origin, and probably forms a much more frequent link in the chain of gonorrhœal complications, especially when epididymitis co-exists, than is generally supposed. According to *Horovitz*, it is most frequently caused by severe suppuration in the posterior part of the urethra, and the complication spreading to the vesicles by the lymphatic and blood passages.

The various complications of this disease (atrophy, obliteration, ectasia, etc.), are often only discovered accidentally at the autopsy.

Acute inflammation of the seminal vesicles may only be positively diagnosed when considerable hypertrophy of the gland exists (*Kocher* found in one case a cyst containing 50 cubic centimetres of pus), which may be felt from the rectum. In such cases the vesicles are felt behind the prostate, and are all pulpy and enlarged. The other symptoms, such as fever, sensations of pressure, pain, strangury, painful erections, discharge of a fluid containing spermatozoa, painful pollutions, the existence of pus in the seminal fluid, etc., have such a varying significance that one cannot attribute them to spermacystitis only. Hæmorrhagic seminal discharge, "hæmatospermatorrhœa," considered by *Rapin* as the "chief symptom," and compared by him to red-currant jelly, is neither constant nor does it belong exclusively to spermatocystitis. Nevertheless, in cases where urethral erosions are not present, it may be taken into account if the first portions of urine do not contain blood in the diagnosis. Hæmatospermia may be observed in epididymitis, but never, as *Lausac* declares, after venereal excesses.

The Prognosis of the form we have just described is in so far dubious, as perforation of the abscesses into the abdominal cavity (*Velpeau*) may cause fatal peritonitis.

Apart from generally accepted principles, the treatment consists in incision of the abscess from the rectum, as *Kocher* recommends, in order to avoid the danger of perforation. For chronic forms suppositories of iodide of potassium may be tried (*Finger*).

GONORRHŒAL EPIDIDYMITIS.

As we intend to describe this condition as a frequent and important complication of gonorrhœa, we chose the above denomination. The other forms of urethral epididymitis which occur after all kinds of inflammation of the prostatic portion of the urethra, as well as the traumatic forms sometimes following strain and pressure of the abdomen (*Duplay, Englisch, Velpeau, Wagner*), and even the "metastatic" forms, are exceedingly rare in comparison to the gonorrhœal forms.

PATHOGENESIS.—Gonorrhœal epididymitis is the most frequent complication of gonorrhœa. According to the statistics of different authors (*Rollet, Hassing, Engelstedt, Bergh, Finger, Krecker* and others), epididymitis is met with in hospitals in 20 to 30 per cent. of all cases of gonorrhœa. In private practice it is relatively less frequent (about four times). Regarding the extension of the morbid process from the prostatic portion, inflammation of the vas deferens is observed (*deferenitis, funiculitis, spermatitis*), which sometimes precedes, and sometimes accompanies it. If in some cases, which are fairly rare, funiculitis cannot be diagnosed, it is on account of the analogy with other inflammations of extension through lymphatic vessels of the urethra leading to lymphangitis.

The special mode of development of this affection is not yet known. We have often seen it break out in gonorrhœal patients confined to bed and under the most careful treatment. Nevertheless, the condition usually develops in patients who neglect their gonorrhœa, or as a consequence of occasional causes (bodily fatigue, especially without suspensory bandages, careless catheterism, etc.). On the other hand, we consider copaiba balsam and injections to be of no importance in the production of this condition. As *Le Fort* has shown, gonorrhœal patients who are careful are less likely to have epididymitis.

In the majority of cases it is unilateral, and may occur on either side (*Bergh*). Both epididymes are seldom attacked *at the same time*. Epididymitis usually takes place from two to four weeks after the infection, consequently at a moment when the inflammation has already attacked the posterior part of the urethra. Epididymitis before the end of the first week or after six weeks is very rare. Nevertheless, the epididymis, like the urethra, may be attacked by acute inflammation in the course of an entirely chronic gonorrhœa.

PATHOLOGICAL ANATOMY.—The organ is considerably swollen, its size more than doubled, its consistency is firmer. The swelling may be attributed, to a great extent, to interstitial changes, such as infiltration by lymphoid corpuscles (*Kocher*). In some not

very rare cases it may lead to the formation of abscesses. The lumen is attacked by purulent catarrh.

Inflammation of the epididymis has also been studied experimentally. By injecting solutions of nitrate of silver and of ammonia into the spermatic duct, *Terillon* and *Malassez* produced cellular infiltration of the interstitial tissue and of the fibrous tunica, dilatation of the lumen with flattening of the epithelium and accumulation of pus. At the end of some months the organ becomes atrophied, as a consequence of fatty degeneration and contraction. Although *gonococci* have been found in the inflammatory exudation, the part they play in the production of epididymitis is not yet known.

Symptoms.—*Pain in the groin*, in cases where inflammation seems to have spared the spermatic duct, and pains in the epididymis, are the chief symptoms at the onset. This pain in the groin, which is, singularly enough, not mentioned in the most exhaustive and recent works on the subject, and which we have almost always observed, either in the history or in the present state, is too intense to be attributed to dragging on the spermatic cord by the swollen testicle. To explain this pain, as also its radiations towards the sacrum, the loins, the abdomen, the upper part of the thigh, we must admit the existence of reflex neuralgia or of extension of the inflammation (*Leyden*) to the corresponding nerve plexuses. During even high fever, which usually disappears after a few days, the epididymis swells to several times its normal size. On palpation, a firm, exceedingly sensitive tumour is found, surrounding the posterior surface of the soft, normal-sized testicle. The tumour is either diffuse or more marked about the globus major; sometimes at its opposite extremity the swelling involves, when funiculitis coexists, the spermatic cord, which is also much swollen, quite round and very sensitive. The patients, on account of the relationship existing between the tumour and the internal surface of the thigh, present a characteristic gait, the leg describing in walking a half-circle (*Lesser*). Periorchitis (hydrocele) acuta is not uncommon, but the effusion usually disappears when the epididymitis is cured. The testicle itself is rarely involved in the morbid process.

The skin of the corresponding half of the scrotum is œdematous, hot, red, often smooth and shiny ("erythema glabrum").

Epididymitis rarely precedes the urethral discharge (*Bergh*), which usually ceases when epididymitis appears; in other cases it is not influenced by the inflammation of the epididymis, but it is very seldom much increased.

The emitted semen is yellowish-green, and contains pus, but seldom blood, a fact which indicates the existence of a catarrh of the spermatic ducts. In cases of double epididymitis, spermatozoa completely disappear from the semen, sometimes even in a few days (*Terrillon*).

The inflammatory symptoms and the acute disturbances, which in some cases, when the onset is very acute, resemble acute peritonitis, usually last a week, and are accompanied by obstinate constipation.

Improvement sets in at the end of the second week, and at the commencement of the third (often much later when complicated with deferenitis and hydrocele) one may begin to think of cure, as the patient no longer complains of pain. Nevertheless, the organ remains swollen and painful for weeks, and even months, or presents indurated portions in the form of fibrous nodules. In some cases hardness and sensitiveness on pressure go on indefinitely, a warning for the physician not to promise the patient a complete cure *in integrum*. For details on the importance of these chronic conditions with regard to functional activity, see "Prognosis."

Extensive suppurations of a non-tuberculous origin and of protracted duration, ulcerative destruction of the organ and perforation of the scrotum ("fungus benignus"), are uncommon. Caseation and *tuberculosis* are rather more frequent (although *Montaz* alone has observed five such cases), even without tuberculosis of the adjacent organs or the lungs. Atrophy of the testicle after gonorrhœal epididymitis is exceptional.

In a large number of cases, painful neuralgia of the testes persists after the affection is cured.

Prognosis.—As already observed, in the great majority of cases involution of the inflammatory process, although incomplete, takes place, and extensive suppurative or caseous necrotic destructions of the organ are only seldom observed. In so far the prognosis may be considered to be favourable. But we must emphasize the fact that want of care frequently leads to a decided tendency to relapse, or the affection takes the chronic form, which in its turn becomes complicated by hydrocele. If these facts alone are already of a nature to contradict the opinion of physicians who consider the disease as harmless, other considerations show that the prognosis is not good. We are thinking especially of the development of azoospermia or masculine sterility in cases of bilateral epididymitis. It is to us incomprehensible that an authority like *Zeissl* should maintain that the function of the testicles is never affected by this condition, and that he has never seen sterility ensue after double epididymitis. In proof of the contrary, a considerable number of cases of virile sterility can be brought forward, which are due to obstruction of the lumen by gonorrhœal inflammation of the epididymis. To the positive observations of *Gosselin*, *Godard*, *Liegeois*, *Kehrer*, *Giacomini*, *Jullien*, *Krecker*, and others, we can add our own, based on a very conscientious examination for spermatozoa in the seminal fluid of persons suffering from epididymitis.

Diagnosis.—The diagnosis is easy. Nevertheless, confusion

with orchitis is not uncommon, but this should be readily avoided if it is borne in mind that the latter appears in the form of a smooth, egg-shaped tumour, on the posterior surface of which — cases of displacement of the testes are uncommon (*Royet*)—it is easy to make out the epididymis, which has preserved its shape and its normal consistence. Furthermore, orchitis is never complicated by inflammatory œdema of the scrotum. In cases of cryptorchidium, care must be taken not to confound epididymitis with inguinal buboes.

TREATMENT.—The *prophylaxis* would appear clear from the etiology of the affection. We have already observed that wearing a suspensory bandage, and abstinence from all kinds of excesses, may constitute a relative but not absolute guarantee against this complication.

For the rest, we are of the opinion that in the majority of cases (relatively) the cure of gonorrhœal epididymitis may be obtained as rapidly by rest and expectant treatment as by the most complicated local treatment.

As soon as epididymitis appears, all local treatment of the urethra and all injections must be stopped. The patient must be kept in bed and at complete rest. In order to diminish the tension of the spermatic cord, the scrotum should be supported in an elevated position. For such cases we have found a towel to be the most comfortable and simple appliance. It should be folded lengthwise, passed under the scrotum, and the ends fastened under the thighs. The well-known wedge-formed pillow answers the purpose. If rest in bed is impossible, the patient should wear the suspensory bag and bandage recommended by *Horand-Langlebert* and *Zeissl*, made of cotton-wool, gutta-percha-protective, which, in spite of its being somewhat complicated, is very serviceable

If the pain persist in spite of rest, cold compresses may be applied (with some patients whom they do not suit, warm fomentations may be used instead), and in some cases local bleeding and narcotics. Leeches certainly help, but we have latterly followed *Zeissl's* advice, and given up applying them, and prefer hypodermics and suppositories of morphia. Belladonna ointment is, according to our experience, useless, as also salicylate of soda, recommended by *Henderson* as a specific, except, of course, as a means of relieving pain (*Kopp*). Counter-irritation by means of blisters, etc., may be dispensed with in the acute stage; and the same applies to electricity. The good results attributed to electricity by *Tomaschewsky* appear to us to depend entirely on the normal evolution of the affection. Abortive treatment by cauterizing the scrotum — *Lowndes* has latterly recommended *Jordan's* method of painting with strong solution of nitrate of silver—with or without internal administration of tartar emetic, does not seem to us to give any appreciable result. As long as

no abscess exists, incision or puncture of the testis appears to us useless. Great attention must be paid to the state of the bowels.

When the intense inflammatory symptoms are subdued, many physicians do not hesitate to apply *Fricke's* adhesive plaster bandage. We have employed this method for several years, but have now given it up. These bandages are not harmless, on account of the danger of possible severe scrotal inflammation, even gangrenous destruction, and serious nervous symptoms resembling shock (*Fischer*). *Loebl* and *Miliano* have replaced this bandage by a linen or worsted bag provided with strings. To take for granted the efficacy of all kinds of compressing bandages seems to us in principle so wrong, that we can only admire the *vis medicatrix* of Nature, which is in the end victorious *in spite* of these applications. There is nothing to be said against applying ung. hydrarg. cin. to the scrotum, as recently recommended by *Stacquart*, only no appreciable therapeutic effect must be expected.

If the patients cannot be kept in bed, they must wear a well-fitting suspensory bandage. Moreover, we prescribe iodine, not applied only once daily in a thin solution, but in the form of painting with pure tincture of iodine, as long as the pains arising from the dermatitis allow of it. Then the scrotum is enveloped in cotton-wool, and the procedure is repeated once or twice after the skin has entirely peeled off. It seems to us that this method favours the reabsorption of the inflammatory products. Internal use of potassium is in our opinion useless.

BALANITIS.

BALANOPOSTHITIS, BASTARD CLAP. BLENNORRHAGIA BALANI.

The ETIOLOGY of inflammation of the gland and the inner surface of the prepuce much resembles that of venereal warts. The two affections often coexist. A simple accumulation and decomposition of the caseous secretion of *Tyson's* gland, of smegma præputiale, may, especially in cases where a long and tight foreskin exists (circumcised persons are very seldom affected), lead to this condition in predisposed individuals, whose general health is otherwise good. The more fluid the smegma, the more hurtful its action (*Finger*). Insufficient cleansing of the prepuce plays a considerable part. We know of cases in which the affection was produced in one day after a long hot walk.

The disease may be caused by the presence of foreign bodies, mechanical irritation, venereal excesses, while balanitis in persons given to masturbation appears to us doubtful. On the other hand, in such persons the prepuce and the gland are remarkable for their cleanliness and dryness.

The affection further appears as a complication of gonorrhœa

from the fact of contact with secretion—without gonococci playing an important part—or concomitant with it as the result of infectious coition, or as a partial symptom of soft and hard chancre of the gland and the inner surface of the prepuce, or of herpes progenitalis.

We have, like *Finger*, often seen pouches and furrows developed in consequence of rough circumcision extending over the sulcus coronarius, and become the seat of a very obstinate balanitis.

Finally, it is found in persons suffering from diabetes, *i.e.*, balanoposthitis of mycotic origin. The sugar contained in the urine and remaining in the preputial fornix forms a fruitful soil for micro-organisms (*Friedreich, Simon*).

The subjective SYMPTOMS commence with heat and itching; later violent pain sometimes sets in. A creamy, yellowish-green, sometimes exceedingly fœtid secretion, containing smegma, flows out of the orificium præputii. When the prepuce is attacked by inflammatory œdema, after removal of the pus, red excoriations are found on the surface of the glands, very painful when touched, and with a tendency to bleeding. Through attendant lymphangitis there may be considerable swelling, but in the slight forms the intense inflammatory œdema which is met with in indurated chancre of the prepuce is never observed. Chronic œdema or elephantiasic conditions are never permanent. We have only observed gangrene and perforation in cases when chancre was present. (For details regarding the co-existence of agminated condyloma, *cf.* this affection.) The purulent secretion possesses no remarkable bacteriological characteristics, but naturally contains various species of bacilli and cocci. The presence of gonococci (*Alvarez*) may be considered as accidental. Smegma bacilli are of no importance.

We should not even mention the DIAGNOSIS of this disease if confusion with gonorrhœa was not so common with inexperienced and casual physicians. We know of several cases where the syringe was used for balanitis. These diagnostic errors are unpardonable, especially as the gland may be exposed by a retraction of the prepuce. On the other hand, in cases of acute inflammatory phimosis differential diagnosis with indurated chancre is very difficult—in fact, almost impossible when perceptible induration and appreciable adenitis do not exist. Regarding differential diagnosis with urethral gonorrhœa, pain along the urethra is absent in balanitis, and the first jets of urine after cleansing the prepuce do not contain pus. The further course of the complaint is very important for diagnosis, and decides the existence of external gonorrhœic urethritis.

The PROGNOSIS of simple balanitis is favourable. With suitable treatment the affection is cured in four to eight days. In rare cases adhesions between the gland and the prepuce result.

The TREATMENT is very simple in ordinary forms, uncomplicated with chancre. Rest and injections of *weak* astringent or antiseptic solutions, tampons of cotton-wool, application of mild powders, generally lead to a rapid cure. When inflammatory phimosis exists at the same time, it is important not to convert it into a paraphimosis. In some cases incision of the prepuce, phimosientomy, is necessary. Care must be taken not to scarify an œdematous prepuce too hastily. The effect is often only to aggravate the condition.

The best prophylaxis against a relapse is scrupulous cleanliness of the prepuce. *Pitha's* advice to close the orificium præputii during micturition, so as to make the urine pass between the gland and the prepuce, does not seem to us, in consequence of possible decomposition of urine, as advisable as daily cleansing with soap and water.

MORBID LOSS OF SEMEN.

MORBID POLLUTIONS.

DEFINITION.—We prefer this denomination to that of "involuntary" loss of semen, which distinguishes, it is true, the affection occupying us from voluntary ejaculations (masturbation, coitus), but allows of confusion with *physiological* pollutions *during sleep*, accompanied by erections, and nearly always with voluptuous sensations and erotic dreams. These pollutions naturally occur usually during the night (pollutiones nocturnæ), but also sometimes during sleep in the day (afternoon nap), so that the right name for these pollutions is not "nocturnal pollutions," but "sleep pollutions," in distinction to the pathological pollutions when the patient is awake (pollutiones diurnæ).

The pollutions become *morbid* by reason of their frequency and their reaction on the general health. The influence of the constitution, temperament, manner of living, etc., does not permit of an absolute statement, as the connection of physiology with pathology is so very varied. As a rule, morbid intervals vary between ten and thirty days. A much more important factor is the *relative* frequency (*Curschmann*), which depends on the peculiarities and power of resistance of each person, and disturbances, especially mental and bodily exhaustion, instead of the sensation of relief which characterizes normal pollutions. The pollutions become pathological as soon as they are separated by the space of at least a week, or occur several times in the same night, or manifest themselves even when the individual indulges in venereal excesses (*Hammond*).

In such cases a decrease in the power of erection (*cf.* "Impotence") and in the quality of the semen is usual. Morbid pollution attains its height when occurring in a waking condition

without masturbation or coition, either after a slight *mechanical* influence (sitting for a short time on the genitals, touching them, slight shock), or after purely *psychical* irritation (reading immoral books, looking at exciting objects, or after erotic imaginings). These waking pollutions, so nearly connected with impotence, are by no means frequent—at any rate, much less so than is represented in books. Erection and orgasm *may* be absent, or be replaced by a feeling of disgust and pain, but, according to our experience, ejaculation is never entirely absent.

Spermatorrhœa is a badly chosen term, for this name implies, like gonorrhœa and leucorrhœa, the idea of a continuous discharge of semen, while on critically consulting literature, it will be observed that this condition is most uncommon. We have thoroughly studied this symptom in traumatic lesions of the spine, and we have several times observed it as a transitory symptom of serious myelitis, once with a patient suffering from hysterical neurasthenia, and also in cases of spinal irritation during violent walking. Besides this, a *latent* form of spermatorrhœa exists, which is much more frequent, where *semen is found in the urine*, independently of pollution. This condition is named by *Grünfeld* "*spermaturia.*" It is not correct to designate, as even *Curschmann* does, morbid loss of semen as spermatorrhœa in the widest sense of the term, and to consider nocturnal pollutions and spermatorrhœa as identical. Thus, we consider it more correct and more exact to reserve the name of "spermatorrhœa" for those *losses of semen which are independent of pollutions*, such as occur during defæcation and micturition, without erection, orgasm or voluptuous imagination. These cases have been considered by nearly all authors as the highest degree and the most serious consequences of pathological pollutions, probably because of *Lallemand's* exaggerated opinions. Our personal experience has long proved the absolute falsity of these views, for these forms are very often observed, as *Trousseau* and *Ultzmann* have already remarked, without morbid pollutions ever having existed, and have not nearly the importance of morbid loss of semen, which almost reaches the limit of waking pollutions. Thus, from a practical and scientific point of view, it seems correct to distinguish morbid pollutions and their consequences from spermatorrhœa in the strict sense of the term, and this distinction is especially indicated from the prognostic point of view. *Trousseau* and *Ultzmann* look upon morbid pollutions as a motor neurosis with spasms of the vesiculæ seminalis, and spermatorrhœa as a paresis of the ductus ejaculatorii, and this is a more correct view than *Curschmann* believes. It is easily understood that transitional and mixed forms exist between these two forms. We shall also see that in loss of semen the seminal vesicles are by no means always alone involved.

Furthermore, it is an error that spermatorrhœa during defæca-

tion is relatively rarer than prostatorrhœa, an opinion held, however, by most authorities. Prostatorrhœa is *much* more uncommon than spermatorrhœa. Thus, it is surprising to see the experienced *Hammond* follow in *Paget's* footsteps, and declare he has only observed one case of spermatorrhœa during defæcation, and more than 100 cases of prostatorrhœa and urethrorrhœa. This tends to make us imagine that the microscope has not been used. It is an unpardonable error, and proves retrograde science, to confound, as *Black* does, acute spermatorrhœa manifesting itself by discharge of a fluid containing numerous spermatozoa with prostatorrhœa.

ETIOLOGY AND PATHOGENESIS.—As acute physicians already observed years ago, and *Curschmann* especially proved in his critical and clear monograph on the morbid loss of semen, spermatorrhœa must not be considered as a distinct disease, but as a symptom, as the expression of a general or local morbid condition. The clinical picture observed in these cases is therefore not produced by loss of semen, but this latter is caused by an independent reason with which it is co-ordinated. In the majority of cases, "first local or general troubles arise, which sometimes lead at once to loss of semen, as a very important new phenomenon in the chain of symptoms, or only create a predisposition to loss of semen."*

We divide the causes of this affection into five classes, but we must remark that combinations are very frequent in practice. We classify them as follows:

1. *General nervous irritability*, usually complicated with anæmia and general weakness (known formerly as irritable debility) and related to "neuropathic predisposition," or, to employ a modern expression, to "congenital neurasthenia." Thus, *Trousseau* insists on the intimate relations existing between enuresis nocturna in childhood and the affection we are studying in later life.

2. *Acquired neurasthenia*, particularly that produced by sexual excesses. We must expecially mention masturbation or onanism.

* *Fürbringer* ("Die Störungen der Geschlechts-functionen des Mannes") observes: "We follow these deductions in principle, but must, however, in accordance with *Beard*, emphasize the fact that increased experience has shown us a number of cases of spermatorrhœa in which the general nutritive disturbances and nervous symptoms apparently proceeded therefrom. To this category belong especially those cases in which loss of semen, when the patient was otherwise healthy, was for a considerable time the only symptom; a number of complications usually follow. This ought not to surprise us, as we frequently observe spermatorrhœa, in the form of onanism and of exaggerated sexual intercourse, produce in formerly healthy persons similar morbid symptoms. Such events must not be forgotten, in which only this pathological symptom causes the patient to consult the physician.

"Should we attempt to place these etiological factors on a parallel with those of usual ideas of disease, we think the cause is to be found in errors in diet and intoxications."—W. H. G.

The importance of this vice for functional disturbances of the genital system leads us to treat this subject in a detailed manner.

Our medical vocabulary includes under *onanism Onan's* vice of the Biblical age—nothing more than self-pollution, masturbation (from *manus* and *stuprare*)—thus, unnatural excitement of the genital organs, especially of the glans penis (or the introitus vaginæ), by manipulations made by the individual himself without connection with the other sex, *to the state of ejaculation* or (with women and children) to the *highest degree of excitement.* This definition must once and for all be well kept in mind in contra-distinction to the meaning of onanism as coitus sterilis (supported amongst others by *Capellmann*, and more in accordance with the Old Testament), and in contra-distinction to applying the term for artificially produced sensuality.

We have here to consider an *unnatural satisfying of the sexual instinct.* The vice is exceedingly common. The most competent authors (*Fleischmann, Henoch* and others) have observed movements of the cradle which had the effect on children, and even babies, of giving rise to onanistic excitement. At the same time, these rocking movements, which have nothing in common with unnatural desires, are more likely to produce a feeling of general comfort. Less harmful are the manipulations practised by little children on their genital parts, and which are sometimes accompanied by erection and convulsive symptoms. We have, like *Curschmann*, observed this masturbation in children of five years old and under. But these rare cases have nothing in common with the vice practised systematically, such as is observed in children approaching puberty. Erotic literature (*Gyurkovechky* rightly includes certain Roman and Greek classical works) and pictures, exciting amusements, "loafing about," exciting drinks, contribute largely to the development of this vice. The greater number of those addicted to the vice is furnished by schools, especially boys' schools. Bad example, imitation, want of attention, allow the evil to spread in a deplorable manner, especially amongst boys. In girls' schools the vice is more uncommon. Manners and customs lead to the vice being abandoned later in life, although marriage and old age do not always put a stop to these vicious habits. We know of cases where men, happily married and fathers of families, have not been able to give up masturbation entirely, although they could always enjoy coitus naturalis. Relapse, when for certain reasons the husband is condemned to abstinence, is not uncommon.

We do not believe that *local affections* of the genito-urinary apparatus can of themselves lead to masturbation. Nevertheless, we allow that certain anomalies, such as phimosis, vesical calculus, may be an occasional cause during the first years of life. With a few exceptions, the genital organs of masturbators,

which we have had occasion to examine, were normally formed, and showed no trace of inflammation.

The influence of onanism on the body—we do not here discuss the moral side of the question—is judged by physicians and by the general public in as contradictory a manner as it was fifty years ago, when the intelligent and fantastic *Lallemand*, in his celebrated work on involuntary ejaculation of semen, initiated the literature on this subject in civilized countries. Apart from a whole series of miserable effusions written by physicians, and apart from the mass of books written by half-educated individuals and offered to the public in the daily papers, about the tendency of which no doubt can exist, the most contradictory opinions amongst the most conscientious and observant professional men are met with. On the one side the gloomiest descriptions of the future which awaits every onanist are pictured; on the other, the assurance that the disturbances caused by this vice, if such exist, cease the moment the bad habit is given up. The truth is to be found in the golden mean. Prolonged, frequent masturbation, when begun in early youth, causes in the majority of cases (*Beard*, *Rockwell*) lasting physical and psychical disturbances, which vary according to individual susceptibility. On the other hand, it has been proved that there have been exceptional cases where even excessive masturbation had no evil effects. We quote a case observed by *Curschmann*, where, in spite of energetic masturbation from the age of eleven years, the individual retained his physical and intellectual force, and became a well-known intelligent writer. A professor at a University, who told us that he had followed this practice in spite of a happy marriage, had retained a robust constitution, and is known for his intelligence, and also for his remarkable scientific researches. It can thus be considered as decidedly proved that moderate masturbation only usually causes transitory disturbances, which may become serious when present with other morbid factors. In our opinion, masturbation has no other effect than moderate coitus naturalis, which only causes disturbances in a few persons, *especially those suffering from neurasthenia.*

We now arrive at the much-disputed question whether one can attribute to onanism any other influence than the natural satisfying of the *genital instinct.* *Erb*, *Curschmann*, *Hammond*, and others, reply in the affirmative. Onanism and coitus are the same acts as far as regards the final effect of intense excitement and its effect on the nervous system, for the loss of semen, as a liquid rich in albumin, plays no part of itself, as it only engenders the evacuation of an accumulated secretion, the reproduction of which is very scanty when the loss is frequently repeated (*Hammond*). In spite of *Gyurkovechky's* latest statements, the quantity is usually less in masturbation than in coitus. If onanism is, as a general rule, more dangerous than even exaggerated sexual congress

(a very relative term, as the capability of each individual varies), this fact cannot be imputed to *peculiarities of the act in itself*, for then one would be obliged to believe seriously in the saying, "The unnatural vice of onanism has its Nemesis." The point in question is rather *precocious and exaggerated onanism.* Persons addicted to masturbation have unlimited opportunities to satisfy the passion; complete erection is for them secondary, contrary to what occurs in sexual congress. Masturbators can procure the nervous excitement they seek several times a day, which cannot usually be attained with sexual intercourse. But in cases where natural satisfaction of the instincts and genital desires is excessive the consequences are the same as with masturbation. We do not agree with *Erb*, that the dangerous effect of masturbation results from the fact that onanists are aware of the meanness of their conduct. At any rate, this is only exceptionally the case. Long experience has taught us that most of these individuals, apparently overwhelmed with shame and remorse, morally depressed, have, in opposition to their comrades in guilt, only seldom committed this vice, and that although they incriminate onanism as the cause of morbid disturbances, the same had not the slightest causal influence whatever. We will not, however, deny that the continual struggle between this vice and moral duties has an irritating and exhaustive effect on the nervous system. *Gyurkovechky's* assertion, that, contrary to excess *in venere*, which has an enlivening and satisfying effect, the masturbator is discontented and melancholy, must be accepted *cum grano salis.**

The *symptoms* in these cases are, in principle, the same as those which result from morbid loss of semen. The experienced practitioner often suspects the origin of the evil by the ensemble of the symptoms. In spite of *de Renzi's* assertion, the absence of tendon reflex by no means indicates masturbation. One look at the pale and miserable victim to that vice sometimes suffices to prove a guilty conscience. Based on our own large experience, we nevertheless warn our readers against a too rash diagnosis. We frankly own to having taken basal meningitis and a cerebral tumour in the early protracted stage of development as proceeding from masturbation, the young man having owned to being addicted to the vicious habit. In other cases one meets with neurasthenic individuals who have secondarily, and only to a moderate extent,

* *Fürbringer, op. cit.*, remarks: "*Von Schrenck-Notzing* has studied the whole question from the psychical point of view, and arrived at the following conclusions: Onanism is for healthy persons more hurtful to the central nervous system than normal cohabitation, because imagination replaces reality, which exhausts the nerves. Masturbation injures the *character* by the fact of its undermining the physiological connection to the other sex, and thus one of the most important sources of strengthening individual and social existence is undermined."—W. H. G.

indulged in the vice, but who have become so terrified after reading the filthy literature on the subject that they mislead the physician by exaggerated self-incrimination.*

Serious forms of onanistic neurosis are usually only observed in individuals of neuropathic tendency, and the symptoms of deep mental degeneration only seldom proceed from persons of robust constitution with a normal power of resistance. We always have in mind the case of a robust, intelligent young man who, after several years of excessive masturbation, became only a shadow of his former self.

According to our observations, the genitals of masturbators offer nothing peculiar or abnormal. Certain authors declare that with masturbation the glans and the prepuce present lesions resulting from frequent irritation, and that an abundant secretion exists in the form of smegma in the preputial folds. This description is entirely imaginary, and we are in a position to state that the contrary is generally the case: the more frequent the masturbation, the more flaccid and dry the glans and the prepuce, of course when a recent emission has not occurred. The club-shaped enlargement of the glands so frequently quoted is by no means frequent. Evident inflammatory irritation is only ephemeral, and proceeds directly from the act. What we have already said of the external genital organs is equally true for the mucous membrane of the urethra. We agree with *Ultzmann* and *Grünfeld* that moderate congestion is more frequent with masturbators, but we must say that, in spite of our examination in a large number of patients, we have never been able to find a genuine catarrhal inflammation of the urethra (especially of the prostatic part with corresponding secretion), such as these two authors declare to have often observed in masturbators, unless gonorrhœa existed. This is also *Curschmann's* opinion: "Whether masturbation can really cause inflammatory processes of the urethra, etc., seems very doubtful; we have observed nothing of the kind in masturbators." In cases where, apart from gonorrhœa, discharge exists, "urethrorrhœa ex libidine" is nearly always present, and also a normal secretion by *Cowper's* and *Littré's* glands.

Nearly all authors agree that, regarding the etiology of morbid loss of semen, *excessive coitus* is less deleterious than masturbation. It is impossible to declare, like *Hyde*, that excessive coitus produces more serious and obstinate forms than masturbation. On the other hand, we have observed that excessive sexual congress

* *Fürbringer*, *op. cit.*, observes "that *Lallemand's* and *Tissot's* caricatures and pitiable figures are at the present time hardly worth a serious thought. The majority of onanists in lunatic asylums indulge in a secondary vice. One cannot, however, deny that onanism offers the predisposing causal moment of mental disturbance, and can with nervous patients hasten the outburst of sexual psychosis."—W. H. G.

without masturbation may easily produce pollutions and spermatorrhœa, contrary to *Gyurgovechky's* assertions.

The manipulation through which abusus sexualis causes morbid loss of semen has nothing to do with the loss of the semen itself, even when emission takes place several times a day. The deleterious effect arises from the *reflex action on the nervous system*, caused by increase and frequent repetition of the intense excitement of the whole nervous system directly before the act of emission, a reaction so often observed under physiological conditions. The centres of erection and ejaculation situated in the brain and spine (*Eckhard, Goltz, Budge*) thus become the seat of a *prolonged irritation*, so that the least excitement from the periphery (genital organs) or from the centre (psychical emotions) becomes capable of causing emission. Certain *local* conditions, such as an abnormal increase of production of semen ("plethora seminis"), producing reflex actions in consequence of tension of the walls of the seminal vesicles, and the special excitability of the ejaculatory apparatus, still more favour ejaculation. But in our opinion sexual excess cannot produce *inflammatory* processes in the seminal passages, as *Lallemand* and his followers believe. Urethral filaments in the urine, found in some cases by *Ultzmann* as a result of inflammation of the veru montanum, were probably gonorrhœal remains, or produced by irritation from catheterism. Our numerous observations do not corroborate *Grünfeld's* statement that inflammatory symptoms "nearly always" exist in cases of spermatorrhœa, and can be discovered by the endoscope.

3. The *third* etiological group of spermatorrhœa is composed of *local anatomical* affections of the inferior portions of the genito-urinary apparatus and their vicinity. They frequently form the final cause when such conditions as described in the two first classes exist. In the first place we must mention chronic inflammation of the pars prostatica urethræ and of the *ductus ejaculatorius*, together with dilatation and atony of the same; morbid pollutions in acute gonorrhœa (reflex irritation of ejaculatory centre) are of little practical importance. This is the form predominant in *spermatorrhœa during the act of micturition and the act of defœcation*. It is hardly necessary to observe that for the latter, *gonorrhœa* plays a more important etiological part than masturbation. We know a whole series of cases in which spermatorrhœa was due to gonorrhœa *only*, without excesses or *irritative debility*, a fact entirely contrary to the opinion of authors who do not admit that gonorrhœa may play a part in the development of spermatorrhœa. This does not contradict the fact that genuine "blennorrhagic neurasthenia" exists, in which spermatorrhœa plays the part of a local symptom (see "Impotence"). As we already mentioned some years ago, in 140 conorrhœal males examined by us, and carefully excluding all gases where coitus before micturition, pollution, masturbation,

could have been causal, we found in the urine of twenty-five of them urethral filaments and numerous spermatozoa, without the slightest symptom of neurasthenia existing. *More than* 20 *per cent. of these patients suffered from latent spermatorrhœa*, or spermaturia, without being in the least aware of it. These latent conditions do not often develop into decided spermatorrhœa.

Besides chronic gonorrhœa, stricture of the urethra, habitual catheterism, irritating injections (*Benedict*), inflammation of the seminal vesicles and the prostate, balanitis, phimosis (which may also be produced by masturbation), calculus vesicæ, rectal affections (hæmorrhoids, fissures, oxyuris, eczema), irritating enemata, etc., must be taken into consideration. When hypertrophy of the prostate, without co-existing inflammation, leads to spermaturia—and this is not infrequently the case—the development of the gland has rendered the ductus ejaculatorii insufficient.

Certain authors (*Pickford*, *Davy*, *Lewin*) consider that *straining during the act of defæcation* may be a sufficient cause for the escape of semen into the urethra. But we agree with *Curschmann* that, although under physiological conditions some isolated spermatozoa may, during efforts at defæcation, escape into the urethra, the passage of a considerable quantity of semen is only possible when insufficiency of the ductus ejaculatorius exists.

We do not consider the fact of fæces *mechanically* pressing on the prostate or vesiculæ seminalis, and driving forward their contents, which thus exude from the meatus, as sufficient explanation for the mechanism of discharge during defæcation. *Curschmann* rightly draws our attention to the topography of the seminal vesicles, the orifice of which would through this mechanical pressure rather be obstructed than otherwise. *Sympathetic action*, as already mentioned by *Lallemand*, seems more probable, *i.e.*, that the seminal vesicles participate in the contraction of the rectum. A third factor, not mentioned by any author, the general action of *abdominal pressure*, seems to us to deserve special attention in spermatorrhœa during the act of micturition and during defæcation, especially in the forms not complicated with nervous phenomena. These forms of purely mechanical origin are not absolutely connected with the act of defæcation and micturition, but may also be produced by the simple action of abdominal pressure through coughing, sneezing, etc., and thus one can attribute a certain etiological part to the increase of pressure. We must remind our readers that *Bernhardt*, based on certain clinical observations, which we will discuss in the section on *Sterility*, arrives at the conclusion that the nerves which play the chief part in the act of ejaculation and expulsion of the semen have a *different course* to those which rule the functions of the rectum and the bladder. These observations are not in favour of the hypothesis of sympathetic contraction of the seminal vesicles during the act of defæcation. Finally mention must be made of

the fact that, while the idea of pollution implies not only evacuation of the seminal vesicles, but also of the prostatic fluid and secretions of *Cowper's* glands, the purely mechanical forms of spermatorrhœa only include evacuation of the seminal vesicles alone, *i.e.*, the receptacles for spermatozoa. Very possibly *isolated* discharges of the seminal vesicles exist under the influence of nervous irritability alone; at any rate, in neurasthenic patients who have never suffered from gonorrhœa one meets, independently of abdominal pressure, with a pure spermatorrhœa, the fluid containing no prostatic secretion.

4. *Constitutional Diseases.*—In this division we must first place phthisis; then certain kinds of diabetes and convalescence from acute febrile affections, such as typhoid fever.*

5. Morbid loss of semen may manifest itself either as a consequence of *organic affections of the central nervous system*, especially of tabes dorsalis, in the shape of very frequent pollutions or genuine spermatorrhœa (*Leyden, Charcot, Erb*, and others), or as a sequel to serious *injuries of the spine.* We observed in an old man *continuous* spermatorrhœa produced by a spinal lesion following a fall, which had entirely interrupted the conducting centres. The reproduction of semen was very active. This case is apparently analogous to *Budge's* experiments on animals—experiments which show that the "centrum genito-spinale," situated in the lumbar region, regulates the movements of the muscles of the seminal vesicles, the spermatic duct and the prostate, while the reflex action produced by tension of the walls of the seminal vesicles, and due to the accumulation of semen and the absence of all inhibiting mechanism, produces the conditions giving rise to nocturnal emissions due to "seminal plethora."

For details on the connection of *functional spinal disease* with spermatorrhœa, see "Clinical Type." Loss of semen must never be considered as a consequence of functional disturbances of the central nervous system. The forms observed in *epilepsy* and genuine *psychosis* belong rather to the first etiological group. This is an interesting field of observation for psychical investigation.

One sometimes observes morbid loss of semen as a sequel to intense emotion, such as fear. *Lallemand's* opinion that the serious forms of the affection may develop as a consequence of intellectual over-exertion and sexual abstinence appears to us to be very doubtful. We have never observed such a cause. In the majority of such cases untruthfulness on the part of masturbators is usually found.

* *Fürbringer, op. cit.*, observes: "How far alcoholism belongs to this class is not yet decided. Drunkards have only very rarely consulted us about morbid pollutions."—W. H. G.

Finally, forms exist which cannot be referred to any apparent cause. We have twice seen spermatorrhœa during defæcation appear unexpectedly and without apparent cause in robust and steady young men, and persist for several weeks.

Morbid loss of semen is observed from the commencement of manhood up to advanced old age. *Hyde* cannot be serious in stating nocturnal emissions in youth to consist alone of prostatic fluid.*

Pathological Anatomy.—Systematic researches on this subject entirely fail. The local lesions already mentioned, especially chronic catarrh of the prostatic portion of the urethra and that of the ductus ejaculatorii, have been several times observed post-mortem (*Lallemand, Kaula, Curling*). Recent endoscopic researches have supplied some very interesting facts, but one must always be careful to interpret the phenomena observed in such a manner as not to confound the consequences of the affection with its causes.

Clinical Type.—We have already remarked why a *genuine symptomatology* of morbid loss of semen cannot be said to exist in the strictest sense of the term. We must rather study the nature of the emission and the accompanying symptoms.

Nearly all patients attacked by genuine spermatorrhœa say that loss of semen takes place during the act of defæcation, especially when there is constipation. The discharge occurs at the end of micturition, at the moment when the abdominal pressure is in full activity. Later on, spermatorrhœa also shows itself with normal, and even with diarrhœic stool, and at the end of the act of micturition unaccompanied by defæcation. In this case the flow of semen immediately follows the flow of urine. We have observed a neurasthenic patient who—as he himself assured us, many times a week, at times even daily—evacuated at the end of micturition such a quantity of semen that we observed quite a spurt of the gelatinous spermatic product. Examination of the fluid made immediately showed a large quantity of spermatozoa as well as soft gelatinous formations, but no elements of prostatic origin. It was probably the result of isolated seminal emissions. Another case observed and communicated to us of spermatorrhœa during defæcation, also as a case of isolated seminal emission, was the cause of light being thrown on the function of the prostatic fluid (*cf.* "Sterility"). Loss of semen during ordinary walking—we have only seen one such case—is seldom met with. On the other

* *Fürbringer, op. cit.:* "Reliable large statistics of the etiological part played by various *professions* in this disease do not exist. The reason for this fact is that only a few of the sufferers consult a physician, and then the percentage of the representatives of these classes must be known. Our own experience (especially among foreigners) shows that the malady is most frequent among merchants and bankers; then come teachers, theologians, doctors, artists, and writers. It is most seldom observed in the working classes."—W. H. G.

hand, it is tolerably frequent during jumping, lifting heavy weights, etc.

At the onset of spermatorrhœa and morbid emissions, the *semen* resembles that of healthy men, and is composed of the secretion of the testes, of the product of the seminal vesicles, of prostatic fluid, and of the secretion from *Cowper's* glands. The microscope reveals numerous spermatozoa with their well-known vital peculiarities, a considerable number of more or less voluminous mono- or poly-nuclear round cells, as well as granular cells from the testes. The other elements, such as cylindrical epithelial cells, proceeding from the seminal vesicles, the prostate and the urethra, hyaline globules, stratified amyloid corpuscles, stratified and granular yellow pigment, are seldom found. The gelatinous product of the seminal vesicles, described by us as globulin, is only found in the fresh secretion, in the form of transparent swollen corpuscles of a light yellow colour, which dissolve fairly rapidly and mix with the semen. This rapid dissolution explains why the positive facts have been doubted by *Lallemand* and *Trousseau*. *Bence-Jones* and *Nepveu* also describe peculiar hyaline cells of a tolerably voluminous appearance, arising from the semeniferous canals, casts which are as frequently found in spermatic fluid as in urine. If one allows the semen to dry on a slide, *Böttcher's spermatic crystals* are seen, which form in the semen at the end of a few hours, and which we have studied in a detailed manner under the name *prostatic crystals*. We have already referred to the peculiar smell of semen, which is not due to the secretion from the seminal vesicles or the testes, but rather to the aforesaid crystals.

In certain cases, when the affection is of long standing, the quantity of viscous white testicular secretion diminishes. The consistence of the semen is modified, becoming more fluid and clearer, through deposit of sediment. Further, the spermatozoa are equally affected in their mobility and vitality, which exercises a certain influence on the patient's power of fecundation (*cf.* "Sterility"). The rest of the membranes which adhere to the heads of the spermatozoa indicate that these latter are not yet ripe, while change in the size and the existence of non-caudate, globular monstrosities cannot be attributed with certainty to the affection itself. Discharge of blue semen has been often observed ("cyanospermia"), and *Guelliot*, who recently found in this semen small blue, round elements, is not certain if they are to be considered as chromogenous micrococci or as indigo corpuscles. The indigo substance presents itself in the form of fusiform crystals (*Ultzmann* and others).

In those cases where spermatozoa are entirely absent, it is not a question of prostatorrhœa, but of a condition which we have described under the name "azoospermatorrhœa" (*cf.* the section on "Azoospermia").

In complicated cases of catarrh of the seminal tract and of the urethra, *pus*, and even *blood*, are found in the semen. The former gives the semen a dirty-yellowish colour; the latter produces a reddish, brownish colour resembling currant jelly. We have already mentioned the significance of "hæmatospermia" in the section on "Spermatocystitis." Erosions in *any* part of seminal tracts may cause this, and thus terrify the patient. The aspect of the *external genitals* is not peculiar or abnormal. At most, flaccidity of the scrotum, with diminished sensibility of the skin, is found, while there is slight hyperæsthesia of the glands and the urethral mucous membrane. Sometimes a genuine hyperalgesia torments the patient. Varicocele often also occurs. Small, soft testes are rare, and we have scarcely ever observed genuine atrophy. The size of the glans is sometimes remarkable, even when no inflammatory process whatever exists. In exceptional cases one finds between the glans and the prepuce an accumulation of spermatic liquid. *Balanitis* is rare, if it did not exist before the affection.

Endoscopic examination of the urethra sometimes discloses the existence of inflammatory products, which we have discussed in the section on "Gonorrhœa," sometimes the absence of all anatomical lesion, in cases where the morbid loss of semen is of a purely nervous kind. Care must be taken not to confound hyperæmia and hyperæsthesia with catarrh. Only through such errors is it possible for some authors to assert the existence of inflammatory products in the urethra ensuing from masturbation, and even simple sexual excesses. At the most, we admit the existence of transitory irritation to be of no real importance. Excessive sensibility of the posterior part of the urethra is much more frequent in cases of neurasthenic origin. After what we have said, it is perfectly useless to insist on the erroneousness of new opinions based on *Lallemand's* theory, according to which *all* forms of pathological loss of semen are due to a local affection.

Apart from the presence of spermatozoa, the *urine* only offers considerable modifications when there is coexisting catarrh. We have never observed the spermatic smell of the urine mentioned by some authors. The urine often contains gelatinous formations proceeding from the seminal vesicles, the existence of which, admitted by *Lallemand* and *Trousseau*, has been wrongly denied by other authors. As already proved by us, these granules of globulin resist, to a certain extent, the dissolving action of the urine. Oxaluria, mentioned by *Donné, Curschmann, Beard*, and others, exists in many cases; nevertheless, we cannot believe that it depends on morbid loss of semen. We believe that it is sufficient to look for oxaluria in the urine of nervous and dyspeptic individuals, in order to be convinced that crystals of oxalate of lime are not more frequent in patients suffering from spermatorrhœa than in those suffering from neurasthenia and dyspepsia.

The urine sometimes has a chyliform aspect as a consequence of admixture with semen (*Frerichs, Eichhorst*). *Posner's* opinion that urine with even a small quantity of semen contains propepton, which may be precipitated by nitric acid, deserves attention from the point of view that a "propeptonuria spuria" exists, the source of which (testes? seminal vesicles? prostate?) remains unknown. Urina spastica, as a coexisting symptom, always arises from the general symptoms which we are about to discuss.

We must, however, mention that the number of individuals suffering from spermatorrhœa is considerable. We have remarked that in the majority of cases of spermatorrhœa during defæcation, and especially when it results from gonorrhœa, the general health is not much affected. In another series, these patients complain of general discomfort, of depression caused by the repeated involuntary emissions, erections, and incomplete emissions, but never of the morbid symptoms which we shall describe further on. Even in persons suffering from involuntary emissions, the symptomatic picture is never complete. Sometimes one territory is attacked, sometimes another, and the diversity of combinations of morbid symptoms and their variability is so great that it is impossible to trace a uniform type of these disturbances. The physician must often listen to a long list of neurasthenic symptoms in all possible combinations. The numerous recent works on nervous debility, chiefly *Beard's*, give an idea of the number of these forms, in which the individual peculiarities of each patient are reflected as in a mirror. *Lallemand's* and *Tissot's* depressing descriptions, according to which all the patients are said to be threatened with impotence, spinal affection, idiocy, are very much exaggerated. But, on the other hand, one cannot give too much warning against attaching too little importance to the dangers resulting from frequent and partially chronic pollutions. We agree with *Curschmann* in distinguishing in a general way *nervous symptoms* and *secondary nutritional disturbances*. The former, which must not be mistaken for symptoms resulting from organic affections of the nervous system, are very varied. Psychopathic symptoms, indicating a medium between "neurasthenia" and the psychical disturbance recently described by *Binswanger*, are found, as well as sensorial, motor, and vaso-motor disturbances, in persons suffering from emissions. We have already remarked that neuropathic predisposition plays an important part.

The most frequent complaints are of exhaustion (the patient feels his limbs as heavy as lead), fatigue, loss of energy and memory, intellectual impairment, disinclination to work, etc. It is not the will, but the power to act, which succumbs (*Binswanger*). Usually a short conversation with the patient suffices to reveal his moral condition to the physician. The sufferers are timid and undecided, attacked by genuine misanthropy, and take no

interest in anything. Many devote their time to reading dangerous works on sterility, impotence, etc., which only serve to increase their fears. The apparent mental depression very frequently masks considerable excitability, which often goes hand-in-hand with great sensuality. Insomnia and agoraphobia are frequent. In addition to these symptoms, giddiness, congestion, pressure on the brain, headache, and difficulties in speech (stammering, difficult articulation), are observed, as well as a number of symptoms of *spinal irritation*, such as weakness, stiffness, tremor, formication, deafness, shivering, muscular pains, with increased tendon reflex, languid gait, various paræsthesiæ in the dorsal region, such as boring and burning pains, chill, lacerating pains, neuralgia of the genital organs, cystoneurosis, pruritus ani, etc. Finally, tinnitus aurium, photophobia, photopsia, blepharospasm, impairment of sight, amblyopia, and even amaurosis, are never met with as a sequel to morbid loss of semen.

When a series of the above-mentioned phenomena develops itself, then one frequently—but by no means always—finds the capacity for erection and *virile power diminished*. For details on these symptoms, see section on "Impotence." The majority of these patients suffer from excessive exhaustion after sexual congress, often combined with painful, prolonged excitement.

With regard to the other organs, we must specially mention: *cardiac disturbances* in the form of nervous palpitations and arrhythmia, such as are met with in healthy persons after venereal excesses; *asthmatic conditions*, recently described by *Peyer* under the name "sexual asthma"; *nervous dyspepsia*, with diarrhœa and constipation, etc. These disturbances may lead to serious changes in the general nutrition. The patients become pale, thin and wretched, and seem to be suffering from an organic affection of the stomach.

A certain number of these patients after some time become *hypochondriacal*, and concentrate their whole attention on the state of their genital organs. They literally drive their medical adviser distracted, and are so tiresome to their acquaintances that they are universally dreaded.

Krafft-Ebing distinguishes three forms of sexual neurasthenia: (1) *Local genital neurosis;* (2) *lumbar neurosis* (the lumbar centres are in a condition of irritable debility); (3) *generalized neurasthenia*. We admit of this division, which is the one most frequently realized. Nevertheless, exceptions are frequent. We have seen a certain number of spermatorrhœic patients who, after the first morbid loss of semen appears, and without neuropathic antecedents, were seized with cerebral, and even general, disturbances, resulting from some insignificant genital and spinal derangements.

DIAGNOSIS.—Diagnosis of *morbid pollutions* offers no difficulty when the patient answers the questions put to him openly. But

it must never be for one moment forgotten that a large proportion of patients who complain of involuntary loss of semen are not pollutionists, but masturbators and liars. They consider that they have told the physician all that is necessary when they have confessed to loss of semen, and they try to conceal that this loss results from their own vicious habits (*Curschmann*). The unmistakable peculiarity of the description of the nocturnal pollutions, with which every tolerably experienced physician is acquainted, has often led us to discover the truth at once.

The diagnosis of *spermatorrhœa—i.e.*, of spermatorrhœa during the act of micturition and defæcation—ought never to be made without the microscope, for it may always be a question of gonorrhœa, urethrorrhœa ex libidine and prostatorrhœa. *Malécot* has even devoted a whole chapter in his book to "spermatorrhée imaginaire." But even in cases where spermatozoa are found in the discharge, the diagnosis is not by any means certain. As we have already stated, it may be a case of pseudo-spermatorrhœa—*i.e.*, an accidental appearance in the urethral discharge of the spermatozoa left in the urethra after a voluntary emission or physiological pollution. On the other hand, in gonorrhœa spermatozoa may be found in the discharge without preceding sexual congress, onanism or pollution. These are the preliminary forms, which, as we have seen, are by no means rare. They sometimes remain abortive, then disappear and develop progressively into genuine spermatorrhœa. We have already observed that the appearance of numerous spermatozoa in the urethra may be considered as a physiological symptom. In the cases where numerous spermatozoa are found in the discharge without the conditions indicated, it is always a case of spermatorrhœa.

Care must be taken not to confound diseases of the heart and stomach with the consequences of morbid pollutions. But also the opposite danger is not unimportant, viz., that the symptoms of serious organic diseases, which coincide by chance with morbid pollutions, may ensue from the latter. A methodical examination of all the viscera usually prevents unpleasant mistakes.*

Prognosis.—The prognosis is even more uncertain than most authors admit. But the melancholy pictures drawn by *Lallemand* and *Tissot* are at any rate very exceptional, and death is never the direct consequence of morbid pollutions. The longer nocturnal pollutions last, the more intense the general disturbances. If a neuropathic predisposition exists, a certain degree of impotence develops, causing hypochondria very difficult to cure. The prognosis is more favourable when the organism is capable of resistance, the constitution robust, and when the patient is grown up. In masturbators the morbid pollutions often disappear as

* *Fürbringer, op. cit.*: "*Eisenlohr* has proved *tabes* to be an important diagnostic factor."—W. H. G.

soon as they renounce their vicious habits. This spontaneous disappearance is also observed in patients not addicted to this vice, especially during travelling.

Beard and *Rockwell* regard the prognosis of sexual neurasthenia and "loss of semen" as favourable in nearly all cases. These authors appear to us to be rather optimistic, if complete cure of the morbid symptoms is meant. *Krafft-Ebing's* statement seems to be nearer the truth. He considers the prognosis favourable in the *stage of local neurosis*, but less and less favourable the more the neurosis involves other regions (spinal and general symptoms!).

We do not agree with *Lallemand* that the prognosis becomes better when a local cause of the affection exists. His opinion is perfectly explained by his special treatment. Our experience teaches us that in these cases, especially in the forms caused by gonorrhœa, spermatorrhœa is much more obstinate than in simply nervous forms. Thus, we have not much faith in local treatment. We give spermatorrhœa during the act of defæcation a much more favourable prognosis than pollutions during the day, in spite of *Lallemand's* theory that this form is the more serious. According to our experience, cases are not rare where the patients retain their virile power, and beget numerous children. When spermatorrhœa is manifested during the act of micturition, the cases seem to us to be much more serious, but even then the prognosis is not the same as for the final stage of morbid pollutions. In these cases decrease of virile power is not rare. Absolute impotence occurs more frequently in the case of diurnal pollutions.

In a considerable number of cases the prognosis, fairly favourable in itself, is made gloomy, thanks to *Lallemand's* works, and even more by the absurd articles in the daily papers. If the physician succeeds with such patients (like *Kocher*, we find that the greater number are schoolmasters) in separating the real disadvantages convincingly and clearly from their imaginary prejudices—often no easy task—good results may be obtained. Epilepsy, melancholia, general paralysis, never occur as direct consequences of spermatorrhœa.

On the other hand, the optimism with which *Hyde* proclaims the frequent pollutions in boys as a physiological phenomenon is to us quite incomprehensible.

TREATMENT.—The prophylaxis must be adapted to the etiology of the affection. We leave it to pedagogues to find methods against masturbation and "mental onanism," and this plays an important part in education. When a child is suspected, he must be watched day and night, and even when in the water-closet; he must be severely punished, and even occasional corporal punishment is necessary. In youths the deplorable consequences of their bad habits must be made clear to them. The physician has usually more influence than parents, teachers or friends. In cases where the bad habit is stronger than the will,

good results may be obtained by change of residence and surroundings. Removal from bad society and corrupting books, travelling, a sojourn in the country, combined with severe physical exertion, have entirely cured many an inveterate masturbator, who formerly struggled without success against his bad habits when following his usual mode of life.

The physician must not be influenced by the so frequent excuse, "sins of youth." In half the cases, by careful questioning of the patient, it is discovered that the bad habit has been continued after the patient was grown up, and often in the case of persons one would never have suspected of the vice. Even in the country the vice is met with among peasants' children accustomed to the hardest manual labour. On the other hand, scepticism must not be exaggerated.

We are convinced that "marriage is an excellent regulator" (*Curschmann*), but it is not always of great assistance. According to our opinion, the best advice for masturbators is natural sexual congress without marriage, a solution which deserves more consideration than most authors give it.

Medical advice does not give marked results, but the physician has many a thankless task. We always remember the success obtained by removal of phimosis and balanitis, rectal affections, and other local diseases which exercise a permanent genital irritation (*oxyuria*). Sometimes a favourable result is obtained by painful manipulations of the prepuce. We cured a young man by simply making an incision in the anterior part of his prepuce. A young lady, who even in society was a prey to sensual passion, was much helped by repeated cauterization of the vulva. But all these procedures have seldom permanent results. The same may be said of the introduction of sounds into the urethra, a procedure which seems to us to be very inefficacious. Care must be taken not to increase the irritation, and thus produce painful complications. Children playing with their genitals at night-time ought to have their hands bandaged to the side of the bed (*Ultzmann*).

With respect to the indicatio causalis, this affection can scarcely be separate from the prophylaxis. We only remark that we have hardly ever seen cases of morbid pollution caused by abstinence, and we have therefore never ventured to recommend sexual congress to youths, but we have frequently directly contradicted the advice of other physicians, and not to the disadvantage of the patients. But we do not deny that loss of semen and pollutions are sometimes *exaggerated* by an abstinence which is not in keeping with the age and the strength and the manner of living of the patient. In these cases, regulation of genital activity through marriage offers good results. We will not now discuss the serious organic affections which may lead to morbid loss of semen, such as tabes dorsalis, etc.

Rational treatment of irritable debility and of neurasthenia is indicated. The treatment must be established according to general rules: restriction of physical and intellectual over-exertion, a regular mode of life, good bland diet, without absolute prohibition of wine and beer, are the means which, in association with sensible psychical treatment, intellectual occupation, without exciting literature, may produce really brilliant results in cases not very far advanced. Moderate coitus should not be forbidden to married patients as long as sexual connection is not followed by any special disturbances and marked exhaustion. A holiday in the country or in the mountains is very efficacious. We have seen cases of spermatorrhœa during the act of defæcation, in which all kinds of treatment, including electricity, had been of no avail, cured by travelling. Methodical hydrotherapy is much praised. On the other hand, we must agree with *M. Rosenthal* and *Curschmann* in considering *local* cold application to the genital parts (hip-baths, douches) as somewhat dangerous. Exceptional cases in which this treatment is not only well borne, but even followed by permanent good results, in our opinion only confirm the *rule*. When hydrotherapeutics are indicated, they must be commenced gently; the water must not be cold enough to be unpleasant to the patient. Even when the patient offers a normal and healthy reaction after the effect of the cold water, it is not by any means certain that it is not injurious. If the physician is not very well acquainted with the director of the hydropathic establishment, if he fears that he might prescribe too cold douches in spite of what he has told him, hydrotherapeutics are best avoided. The old opinion, that only robust patients may be sent to the sea, seems to us erroneous. Sea-baths for individuals with slow circulation, and mountain air for persons suffering from erethismus, may be correct (*Arndt, Von Ziemssen*), but we have seen cases where the roar of the ocean has done more towards calming irritable patients than the tranquillity and repose of the Alps. *Strümpell* especially recommends a sojourn by the sea to thin and nervous patients, with a view to exciting their appetite and calming their nerves. In cases of frequent pollutions in excitable persons, we have always obtained excellent results from tepid salt baths. It is impossible that these cases were simple forms of spasm of the vesiculæ seminalis.

In cases of advanced *neurasthenia* we have seen astonishing results from a methodical *Playfair-Mitchell* cure. *Binswanger* was the first in Germany to draw attention to the excellent effect forced nourishment, rest, massage, electricity, and hydrotherapeutics have in cases of "exhausting neurosis." A large number of physicians advocate this mode of treatment, but only a few possess methodical observations (*Charcot, Bockart*, and others). Our personal experience has shown us that this treatment must be adapted to each individual patient with the same care as

is exercised in hydropathic establishments. *Schreiber* also insists on this fact. The abuse of massage makes some spermatorrhœic patients thin and emaciated, and others fat and sleek, while the affection itself remains unaltered. Under the influence of rest some take a dislike to all kinds of work; others become much worse the moment the treatment is commenced. We have seen the best results when, instead of prescribing absolute bodily and mental repose, we have insisted on out-of-door exercise and moderate mental exertion. Custom and taste have replaced electrodes and ordinary water by electric baths, which are very popular and generally suit the patient, but which have no superiority over the old method of treatment. When a "modified" *Playfair* cure is decided upon, *combinations* of the different factors must not be neglected, for in this lies the whole value of the method. Even when all the individual peculiarities of each patient are taken into account, perfect cures are rare. Half the patients submitting to this treatment are considerably improved and are comparatively cured. One must be certain that the treatment be conducted in a modified but not too incomplete a manner. On the other hand, we must bear in mind what *Leyden* says, viz., that this long, expensive treatment calls for sacrifices not always justified by the results.

Various drugs of course exist, said to be specifics for this disease. We have prescribed them all according to indications (atonia, spasm), and regret that we cannot recommend any one of them as really efficacious. Lupulin, camphor, strychnine, have proved utterly useless. The most effective seemed to be a large dose of bromide of potassium taken before going to bed. Morphia combined with cocaine appeared to be even more efficacious. Unfortunately, the long duration of the illness does not permit of the use of these drugs. Antipyrin and sulphonal have little effect.

Regarding *local treatment*, caustics and astringents are only indicated in cases where *inflammatory* conditions exist. Under this head chronic gonorrhœa is the most frequent, and its treatment in these cases is the same as that already described. We are convinced that veritable triumphs may be obtained by local application of caustics (*Guyon*, *Ultzmann*, and *Grünfeld*) on places determined by the endoscope, application made by means of various porte-caustiques, porte-remèdes, syringes, instillators, and irrigators. The same good results are sometimes obtained by *Oberländer's* method of dilatation. Nevertheless, it is not without danger to limit one's self to a uniform and *systematic* treatment of the urethra, in cases where inflammatory modifications are complicated with nervous symptoms—in such cases the specialist must act in accord with the neuropathologist, as *Hegar* rightly remarks—especially in cases of neurasthenia independent of anterior gonorrhœa. After having been formerly in favour of a local treatment *à tout prix*, experience has taught us that its

advantages and disadvantages must be most carefully considered by the physician, if he does not wish to see the disease become worse, as it has sometimes an irritating effect. The nervous system may have been affected to such a degree by an old disease of the genital organs that it remains affected after the latter are cured. We have often seen the nervous affection become better, and even be quite cured, by stopping all local treatment of the urethra, and by sending the patients into the country. In spite of *Grünfeld's* and *Lallemand's* assertions, all instruments and porte-caustiques become dangerous when in inexperienced hands, and may cause cysto-pyelo nephritis and fatal pyæmia (*Rose*). *Malécot* has shown the disadvantages of this method, and it is much to be regretted that the majority of young practitioners accede to the desire of neurasthenic patients, and allow them to follow a course of local treatment. Complete cures obtained by local treatment may generally be considered as improvements due to the psychical influence of local manipulations. With nervous patients, on the other hand, cases are very numerous where the patients become worse under treatment. One certainly learns to know the detrimental effect of the "murderous weapons with which young practitioners who have just left the University fall over the poor urethra" (*Distin-Maddick*).

In cases where considerable irritation of the pars prostatica exists, but where examination of the urine and the use of the endoscope do not point to an inflammatory condition, good results are sometimes obtained by the *careful* and methodical introduction of sounds and the use of *Winternitz's* psychrophore. Very cold water should be avoided, and the treatment should not last too long. In these cases, also, the physician must be guided by the individuality of the patient. We consider these two local methods as the only ones possible in genuine nervous cases. Local treatment with cocaine is under certain circumstances of great value, but cannot be employed as a continuous method of treatment.

The affections mentioned in the section on *etiology*—calculus of the bladder, varicocele, affections of the rectum, balanitis, etc.—require special treatment. In cases of balanitis accompanied by phimosis, surgical treatment is sometimes very efficacious. Regulation of the bowels plays an important part in treatment of spermatorrhœa, and attention must be paid to the slightest sign of constipation. We prefer in such cases saline purgatives or aloes to cold enemata. A loaded rectum is equally to be avoided in cases of pollutions. A motion of the bowels in the evening should be insured if possible, and little should be eaten in the latter part of the day.

Trousseau, Pitha, and *Stadler* recommend the introduction into the rectum, or application to the perinæum, of "prostate compressors." We have no personal experience on this point, but a

great many of our patients have tried instruments also intended to prevent pollutions, with but little success. The majority were relieved when the instrument was removed. We agree with *Malécot* in rejecting all these instruments, and especially *Tenderini's* belt.

Castration in such cases must be rejected as a most absurd procedure.

We have great confidence in *electric* treatment for morbid loss of semen, chiefly in abnormal pollutions. The galvanic current is generally to be preferred (*Schulz*, *Benedict*, *Erb*, *Richter*, and others), although good results are often obtained with faradism. According to *Erb*, galvanic treatment is more indicated in forms complicated with "irritating debility." The different modes of application are unimportant. Thus, according to *Wagner*, the faradic current is to be recommended in nervous forms, while in cases complicated with inflammatory processes of the urethra, once gonorrhœa has disappeared, local application of the galvanic current can only produce good results; but most frequently in these latter cases (we know of several) general and psychical treatment are added, so that the individual value of the galvanic current is considerably diminished. In general we follow *Erb's* method, and apply the positive pole to the lumbar region, and the negative pole either labile or stabile along the spermatic cord, on the penis and on the perinæum. General faradization, as employed by *Beard* and *Rockwell*, is sometimes very useful. Strong currents should be avoided. Direct application of the current on the ductus ejaculatorii by means of an electrode catheter must be carried out with the greatest care in order to avoid eschars. *Möbius* and *Ultzmann* recommend rectal electrode. In a limited number of cases a good effect was observed after about a fortnight. Other forms are more obstinate. Electricity has no effect whatever in a considerable number of cases, especially in those in which spermatorrhœa is consecutive to gonorrhœa.

Finally, we must not omit to mention that some cases of morbid pollution and spermatorrhœa disappear spontaneously after all kinds of methods have been tried in vain.

VIRILE IMPOTENCE.

By the term "impotence" we mean the impossibility of carrying out sexual congress in a normal manner or otherwise, without taking into consideration the condition of the generative powers, the extinction of which may be a consequence of impotentia coeundi (*vide* "Sterility"). The essential condition of potentia virilis is the *capability of erection* of the penis, without which emission is impossible. Then follows libido (*sc.* "sexualis"), the power of ejaculation and orgasm, *i.e.*, the voluptuous sensation,

which may be distinguished from sexual instinct. The former becomes more normal through the mechanical factors of peripheral irritation, and is strikingly compared by *Rockwell* to a sensation of tickling. Virile power as such is destroyed when one of these four factors is disturbed.

The *causes* of impotence or decrease of power are manifold. We will first mention those forms, not especially interesting from a clinical point of view, in which sexual congress is *mechanically* impossible from abnormality of the penis, extensive injury, congenital malformations, and especially very pronounced hypospadias, tumours, deviations during erection resulting from destruction of the corpora cavernosa from injuries or inflammation, abnormal positions due to the development of large tumours in adjacent regions (inguinal hernia, hydrocele, elephantiasis scroti), etc. For details on prognosis and treatment—we do not know an efficacious treatment for incurvation of the penis produced by partial atrophy of the corpora cavernosa — *vide* surgical text-books. We will also pass over those forms in which absence, atrophy, or destruction of the *testes* impedes erection of the penis, although power may be retained for a certain length of time, as is observed in eunuchs, and discuss those cases in which impotence exists with *externally normal* genital organs. Impotence must here be considered as a *partial symptom* of a *general affection*, as, for example, nephritis chronica, diabetes (*Seegen*), morphinismus chronicus (*Levinstein, Erlenmeyer*) — the weakening effect of abuse of iodine, arsenic, lead, salicylic acid, is much exaggerated; for details on the effect of alcohol, see below—of many, but by no means all, kinds of serious cachexiæ (phthisicus salax!), and finally as a consequence of serious cerebral and spinal diseases, especially tabes dorsalis: during the course of the latter malady increased virile power, even satyriasis, may arise. The pathogenesis is not difficult, since *Goltz* and *Eckhard* have proved that the centres of erection are localized in the lumbar region. Paralysis and irritations of these centres, interruptions and irritation of the fibres conducting towards the brain, play an important part. Erection is produced from the brain and the spinal cord (psychical, viz., sensual excitement, spinal irritation from various causes) and the tracts of the nervi erigentes (friction of the gland, irritation from inflammatory conditions of the seminal vesicles, the prostate, the urethra, the bladder, compression through fulness of the bladder, which probably plays the chief part in morning erections).

While in all cases where it arises from an incurable affection impotence is *absolute* and persistent, we usually meet in the two chief groups *impotentia psychica* and *impotence from irritable debility*, with a *diminished* power or transitory temporary impotence. These are the forms which the practitioner most often

[1]. In the first edition of this book we remarked that it

was impossible to establish a sharp distinction between these two groups. Since then our experience, increased by several hundred new cases, has shown us that in the majority of cases decrease of power was a symptom of *neurasthenia. Gyurkovechky* has arrived at the same conclusion. According to him, simple psychical impotence is very rare; patients of this kind nearly always suffer from neurasthenia. The old denomination, *nervous impotence,* which partially corresponds to the ideas of *Beard, Rockwell,* and *Hammond,* should be maintained. The nervous affection may produce disturbances *strictly localized* to the genital system, in the same manner as "nervous dyspepsia" and "cardiac neurosis," manifestations of neurasthenia, are not accompanied by disturbances of the other organs. When impotence is, as is usual, accompanied by spermatorrhœa, the latter is still a sequel to neurasthenia.

Nevertheless, the existence of a genuine *impotentia psychica* must by no means be denied. It occurs frequently in the case of men soon after marriage. They perceive with horror that, without having indulged in venereal excesses, and without being attacked by nervous weakness, the absence or insufficiency of erection prevents the introduction of the penis, and shame at this discovery, and fear of appearing despicable to their wives, drives them to the physician.* Some patients cannot understand the reason of their misadventure, as before marriage the energy of their erections left nothing to be desired, and potentia coeundi was normal. They are often so unfortunate as to have erections at every other moment except when they are with their young wives. In these conditions, when it is a case of a man of irreproachable character as far as coitus and masturbation are concerned, this state may be attributed to timidity and want of confidence. The ardent desire to accomplish coitus, to have erections, and the fear of failure, may absolutely prevent the normal course of the reflex process. During the first attempts the want of success is physiological, and is explained by the violent excitement. The moderating action of the brain on the spinal centres of erection, experimentally demonstrated, also plays a certain part, and we refer to *Goltz's* experiments, who has shown that erection does not occur or disappear in dogs under the influence of intense irritation of another kind.

* *Fürbringer, op. cit.*, describes the following case: "A young physician, aged 29, brought up very strictly, who had indulged neither in sexual intercourse nor masturbation, suffered from erections when in the presence of pretty girls, and was awakened on an average once in three weeks by nocturnal pollutions; the first time he tried coition he failed. He immediately concluded that his voluntary abstinence was the result of incapability. He was engaged to be married to a young, amiable girl, whom he loved deeply, and was so horrified at the idea of his impotence that he consulted us. We found absolutely nothing abnormal in the intelligent young man, and simply advised him to abandon all ideas of impotence. Not long after the lawful time had elapsed after his marriage, he became the father of a fine child."—W. H. G.

Psychical impotence may be due to "imagination." Such patients persuade themselves that their genital organs are atrophied, or they have even more extraordinary ideas. These cases are not uncommon, and one sometimes observes an impotence of fairly long duration, but these facts do not permit one to consider psychical impotence as being entirely due to hypochondria.

In some cases impotentia psychica proceeds from the aversion which this or that woman inspires—sometimes, unfortunately, the man's own wife—where insuperable repulsion or ugliness do not necessarily exist. We have observed cases in which the wife, handsome and well formed, was incapable of exciting her husband as much as any disreputable person could, although he had hitherto led a steady life.

Such cases of "relative" psychical impotence belong to the region of perverted sexual instinct, and are sometimes very embarrassing from a medico-legal point of view. In a case observed by *Rosenthal*, the man was obliged, in order to obtain erection, to think of other women. In one observed by *Schulz* it was necessary to anger him.

In the majority of cases *impotent neurasthenic patients* suffer from morbid loss of semen; *i.e.*, they are also pollutionists whose virile power has suffered. They have either practised *onanism* to a great extent, or they have indulged in *natural* sexual excesses, or they present, through no fault of their own, a neuropathic predisposition. In a certain number of cases *chronic gonorrhœa* exists, even when irritative debility was not hereditary. One may here rightly speak of "gonorrhœal neurasthenia" as analogous to hysteria in women suffering from affections of the genital organs. Those cases of spermatorrhœa which, as we have shown, occur as a sequel to chronic gonorrhœa in a peculiarly mechanical manner through insufficiency of the ductus ejaculatorius, usually exercise very little influence, as they do not affect the nervous system to any great extent. In our personal statistics we have observed in 30 per cent. of the cases gonorrhœa as an etiological factor; in 28 per cent. neurosis caused by masturbation (in 13 per cent. both); in 10 per cent. venereal excesses; and only in 11 per cent. simple neurasthenia. As to age, the patients are usually between eighteen and fifty-two years of age, the majority over forty. As to *professions*, officers, physicians, merchants, are specially numerous, while theologians and schoolmasters, who form the greater number of spermatorrhœic patients, suffer least from impotence. The fact that this condition is hardly ever observed in the working classes is explained by their indifference to disturbances in their sexual and conjugal life.

Amongst the majority of persons of this kind, the affection lies considerably. *Rockwell*, *Hammond*, and especially *Cursch-*

mann, insist on this fact. It is seldom that the condition of these patients remains stationary. The *accompanying* neurasthenic symptoms which are observed in most of the patients, as well as other nervous disturbances, are the same as in spermatorrhœa.

Regarding the special character of the disturbances of the four principal factors of virile power (venereal desire, erection, ejaculation, orgasm), we gave a detailed description of it at the Eighth Medical Congress, and will therefore now only say a few words on the subject. As well as the numerous disturbances of erection which, in certain cases, occur before or directly after intromission, precipitate ejaculation is often observed (less frequently retarded ejaculation or total absence), which takes place with sufficient erection, before or immediately after intromission, and constitutes the first stage of diurnal pollutions.

Three young business men consulted us recently within a short space of time. They all complained of absence of emission. In two of the cases this was the only morbid symptom; azoospermia, deviation or retraction of the ductus ejaculatorii did not exist. The patients were subject to pollutions. The third, who had led a most irreproachable life with normal sexual relations, suffered from insufficient erection, on account of atrophy of the testes. He had never had pollutions. These forms, probably of congenital origin, have nothing in common with acquired impotence with absence of seminal emission. *Rossbach* described a case of isolated paralysis of the plexus (ischiadicus, etc.) pudendalis.

With some individuals ejaculation occurs before penetration, and is nearly always caused by very intense sexual excitement. These cases cannot be classed among those of impotence and spermatorrhœa. In cases of diminished venereal desire—for example, in old men—the situation is then bearable when the wife renounces all sexual connection. But very frequently the want of power only becomes evident from the desire of the wife. This condition is more impudentia muliebris than impotentia virilis. Failing power with increasing desire is especially painful, because of the tortures of unsatisfied desire.

In individuals badly endowed from a genital point of view, onanists and worn-out dissipated men (amongst whom a psychopathic predisposition is not rare), these so-called disturbances lead to the absence of all normal genital excitement and all erection. This is *impotentia paralytica*, under which name certain exponents designate the impotence observed in serious organic affections of the brain and spinal cord, in diabetes, etc. We are inclined to consider such individuals more as qualifying for paralytic impotence than as representatives of the physical form, who have become impotent because "under the influence of corrupt imagination, and aided by disreputable women, they make use of all kinds of unnatural proceedings and positions during coition. With such individuals it is more a case of over-indulgence. When

they are with their wives, and must abandon their unnatural customs, they are incapable" (*Curschmann*). Sometimes erection can only be attained and the extinct desire reanimated by disgusting and unnatural ways. These cases are a transition towards the forms complicated with anæsthesia, weakness and atony of the external genital organs and testes (*Schulz*), and weakness of the whole organism (*Gyurkovechky*). Nevertheless, impotentia paralytica is not necessarily the last stage, but may also, quite apart from impotence in idiots, be congenital. In such cases excitement of the centres of erection and of sexual desire is always absent, even when the general health is good and the genital organs well developed. These forms may be regarded as the highest expression of natura frigida, which sometimes persists a long time in certain physiological conditions. The pathogenesis of these curious cases is still quite unknown.

We must still mention the rarer forms of impotence through *perverted sexual desire* and *intellectual perversion*. The limits of this book prevent our going very thoroughly into this interesting question.

Impotence, studied in a most complete manner by *Krafft-Ebing* as congenital sexual psychopathia, may manifest itself by perverted, and even unnatural, feelings. Most of the interesting cases published refer, according to *Hammond*, to persons with whom the excitement is caused not by the female genital organs, but by feminine apparel (shoes, nightcaps, aprons, etc.), by touching men's genital organs and the anus, by exciting this part of the body by castigation, etc. We have in our experience with these painful cases only met with pæderasty. An accomplished, well-known actor, whose noble qualities we thoroughly appreciated, only found relief for his sexual instinct, which was at times intense, by touching the male genital organs or by intercourse with half-grown-up girls.

Gyurkovechky observed a case of an onanist whose orgasm depended on being badly treated by one of his friends. It is evident that sometimes cases of sodism, pæderasty, and other unnatural sexual intercourse, are associated with our idea of impotentia virilis.

The forms of impotence most frequently observed in consequence of too much brain work, mathematical calculations, literary and artistic work, may be partial or temporary. Venereal desires become extinct, but power returns as soon as the intellectual over-exertion ceases, or when the patient meets an experienced siren or an ardent wife. Moral energy is in these cases so absorbed that but little remains for the satisfaction of sensual desire, society, or amusements (*Hammond*). In a number of cases, especially with scholars, the slightly-developed sexual instinct may possibly play a part (*Gyurkovechky*). These cases form a distinct class of "professional impotence," to which may be added

impotence by reason of physical over-exertion, sedentary life with obesity, etc.

We must not omit to mention two causes of impotence which have been well known for years, and which have been latterly the subject of much discussion—*riding* and the abuse of *alcohol*.

From the time of *Hippocrates* it has been universally admitted that too much riding renders man impotent and changes him into a woman. He did not doubt that with the Scythians riding made the Ἀνανδροι powerless, and he even calls this form of impotence "maladie des Scythes" (*Nysten*). *Hammond*, who has recently studied the subject, has observed a parallel form among the Pueblo Indians. Patients of this kind are called "mujerados," and are said to become pollutionists by reason of too much riding. The testes and external genital organs become atrophied from the continual pressure, and the patients finally become impotent. Nevertheless, we are not able, from our own experience, to agree with this theory (among others also defended by *Lallemand*), as we have not once observed failing power from riding.* One glance at the cavalry proves the folly of the idea (*vide Gyurkovechky*).

We do not deny that *alcohol* exercises a certain influence on man's power, but only when taken in such a quantity as to render the man completely intoxicated. Thus, *Hammond's* theory is incomprehensible to us. He maintains that one excess suffices to prevent the usual conclusion of coitus, to render the husband incapable of fulfilling his conjugal duties for several days, and that alcoholics are usually impotent. *Gyurkovechky* admits that for certain individuals a small quantity of alcohol is sufficient to paralyze the sexual organs, and that even the lightest beer and diuretic wines renders men impotent, on account of the excessive diuresis and the unnatural desire to micturate. With regard to this statement, we must say that in a great number of cases of pollakiuria caused by coffee, water, and drugs, the virile power remains normal, and that in cases where a decrease of the virile power really exists, we have observed the favourable action of fermented drinks, to a certain extent in proportion to the alcohol which they contain. In spite of *Curschmann's* opinion, we make no distinction between beer, wine, and other alcoholic beverages. We only admit that all may retard emission. It is, however, a fact that small quantities of alcohol increase the virile power.

We cannot conclude this section without saying a word on "impotence following abstinence." *Gyurkovechky* considers abstinence to be exceedingly rare, and believes that the so-called

* Of late several cases have come under our observation where the formerly vigorous and quite normal virile power had gradually diminished. When the patients had taken to bicycling to an immoderate extent, impotency had ensued. Whether bicycling was the cause remains to be proved. All we can say is that other predisposing factors were not evident and nothing had been changed in the patient's manner of life.—W. H. G.

"abstainers" are, with a few exceptions, onanists. We do not go so far, and simply believe that these persons are endowed with very small genital power, and what is supposed to be *virtue* is nothing more nor less than weakness. On the other hand, in spite of the undeniable connection between activity of the generative gland of individuals arrived at the age of puberty and the degree of their libido (*Krafft-Ebing*), and in spite of the cases described by *Gyurkovechky* of diminished power in officers who have been forced to be abstainers, we are almost as sceptical regarding the impotence as regarding spermatorrhœa from abstinence. Absolute or relative abstinence may temporarily diminish the virile power in healthy individuals, but it is quite incapable of completely extinguishing it. We know old men of sixty and sixty-five years of age who have been able to carry out sexual congress after ten years' abstinence.

Diagnosis.—The diagnosis of impotence is contained and proved in the description of the disease. We warn our readers against diagnosing "nervous impotence" before being certain that diabetes does not exist; morbus Brightii is here of less importance. We have frequently observed neurasthenic symptoms in impotent diabetic patients. It is evident that in all cases of weakened facultas virilis one is apt to suspect tabes and other organic spinal affections. One must also be on one's guard against morbid changes in the brain, especially cerebral syphilis.

Prognosis.—The prognosis of impotence is, apart from cases in which a mechanical obstacle to intromission exists (see above), doubtful, with favourable tendencies when serious organic affection does not exist, or when it is not a case of the congenital, senile, or paralytic form.

We ourselves have seen the nervous form cured in a third of the cases; a third were considerably improved, and a third not influenced at all. Genuine psychical impotence, as well as nervous impotence, when neurasthenic troubles do not exist, or when the latter are limited to the genital sphere, is easily cured under the direction of an experienced physician. We have only met with a few rebellious cases of this kind, and do not understand *Gyurkovechky's* remark that this form is "always very difficult to cure." We agree with *Beard* in not considering the forms of decided impotence ensuing from general neurasthenia, sometimes congenital with or without spermatorrhœa, to be always hopeless, as long as the nervous system is not entirely shattered in consequence of venereal excesses. The prognosis of paralytic impotence is bad.

Treatment.—The treatment of impotence which depends on a mechanical obstacle from malformation of the genital organs is entirely surgical, and we refer our readers to works on surgery.

Psychical and neurasthenic forms, in which the psychical element plays the chief part, call for psychical treatment.

Sometimes a few encouraging words suffice to restore the confidence of the patient in his strength, and to prevent an unhappy childless married life and divorce.

After a patient has brought countless proofs that in case of marriage a fiasco is unavoidable, we have frequently heard later that none of the dreaded symptoms have appeared, especially in cases of men whose past life has been blameless. Nevertheless, we recommend those young men whose marriage night has not been successful, and to whom the idea of impotence has never occurred, to announce a possible failure in order to avoid a too tragic view being taken of the matter.

We especially warn against too frequently repeating the attempt, and against all forced efforts to obtain erection. *Curschmann's* experience that medical prohibition of cohabitation may eventually cure the patient by rendering him unprejudiced, and thus becoming able to transgress and to perform normal cohabitation, must be confirmed by every experienced physician. But, on the other hand, it is certain, as a great number of modern authors maintain (*Hammond, Gyurkovechky*), that abstinence prolonged for months, and even years, plays a most important part in nervous impotence.

In general, the treatment of impotent neurasthenic patients is the same as that of neurasthenia and its complications, such as spermatorrhœa, etc. In the first place we have the *Mitchell-Playfair* method, specially in cases of physical overwork and general nutritional derangements. Embonpoint naturally excludes forced nourishment. But a panacea is here as useless as in spermatorrhœa, and the treatment is sometimes contra-indicated in certain cases. This is immediately seen at the onset.

Local treatment of the urethra with caustics or instruments, with the exception of *Winternitz's* sonde à réfrigération, which is according to *Ultzmann, Zeissl*, and others, to be highly recommended in such cases, appears to us as little indicated as it is in spermatorrhœa. It has no object when urethritis does not exist. We, like *Curschmann* and *Hammond*, have seen the condition of the patient become decidedly worse and the impotence increase. As soon as the treatment was given up, strength returned and impotence gradually disappeared. In cases of chronic inflammatory conditions ("gonorrhœal neurasthenia") it is certain that local treatment *may* give good results, when it is conducted in a sensible manner. Young fanatics for local treatment, who long to energetically attack the poor urethra, will have many unpleasant experiences.

We have already given our opinion on the value, or rather the inadequacy, of *medicinal* treatment. The incomprehensible recommendations of *Rockwell* and *Hammond* do not in the least alter our view. *Gyurkovechky* has also but little confidence in the majority of drugs recommended. We cannot even agree with his

recommendation under certain conditions to exhibit opiates and cannabis indica. Our experience teaches us that strychnine and cocaine deserve some confidence. We have prescribed these two drugs together in cases where former treatment has been unsuccessful and the patients have a craving for drugs, but we are by no means sure that the effect was not simply a psychical one. We cannot give an opinion from personal experience on the inhalations of oxygen, so warmly recommended by *Gyurkovechky* ("ganz bedeutende Dienste"), against various kinds of impotence.

We have a great predilection for recommending *travel* in cases of neurasthenic impotence, but we do not mean merely pleasure parties, which only awake sensual desires, but educational travel, capable of drawing the patient's thoughts away from his sexual condition.

A very delicate and most important question is that of *marriage*. It is a question which must be discussed separately in each case, and, according to our opinion, depends chiefly on the character of the wife. The physician who throws an impotent man into the arms of an ardent woman will cause an enormous deal of misery, just as when he permits a modest young girl to marry a man of dissolute habits.

A suitable marriage is the best remedy against impotence (*Gyurkovechky*), excepting, of course, the paralytic form. The news which we have received regarding the subsequent history of our patients was the same as that obtained by *Beard* and *Rockwell*, and contrary to *Hammond's* experience.

In cases of *paralytic* impotence treatment is as good as useless. It is usually the same as in cases of psychical impotence, and of impotence caused by irritative debility when spermatorrhœa exists. Sometimes the local application of electricity may maintain the virile power. All artificial excitement must be avoided, and over-irritation of the genital organs. In the congenital forms aphrodisiacs may be tried. At the same time, however, we very much doubt that cantharides, strychnine, phosphorus, ergotin, musk, haschisch, cocaine, camphor, etc., produce any effect with patients of this class. The physician must himself decide whether he should order the use of the sledge apparatus (an instrument for introducing the penis into the vagina and consisting in two small, feathery metal ferula). He will, however, frequently not be consulted. The use of such apparatus is usually kept secret.

Treatment of impotence due to *sexual perversion* belongs to psychical medicine. According to *Krafft-Ebing* hypnotism is indicated in some forms.

We cannot close this section without mentioning *Brown-Séquard's* treatment, which consists in *subcutaneous injections* of extracts of *animal testes* (dogs, rabbits, guinea-pigs, etc.), containing blood, semen and parenchymatous portions of the organs.

These "very painful" injections, which often cause intense inflammatory symptoms, are said to have made the inventor of the method (a man of seventy-two years of age) look thirty years younger. They are supposed to cause, according to *Variot*, an intense vital activity in weak persons and agenetic patients, this activity manifesting itself in the first instance by increased virile power. *Parke* and *Davies* consider the active principle of the testicular fluid to be nothing else than *Schreiner's* "spermin," the phosphoric salt of which composes *Böttcher's* crystals, and which, according to our experiments, is solely derived from the prostate. We recognise no scientific importance in *Brown-Séquard's* treatment (which already has been employed by one of our patients, who suffered from perversion of the sexual instinct by applicatio seminis—horribile dictum—humani per os), and in spite of *Brown-Séquard*, *Féré*, and *Dumontpallier*, we are of opinion that what we are now discussing is an intense peripheric irritant (which sometimes produces an exaggeration of virile power, even in idiots) combined with phenomena of auto-suggestion. One of our patients who went to Paris to undergo this treatment declared that he had felt none of the promised effects. Although we have testicular fluid at our disposal, we have never been able to make up our minds to control these experiments which have made a certain sensation in the medical world.

STERILITY IN THE MALE.

The times are over when (decided impotence in the husband not existing) sterility was always imputed to the unfortunate wife. Recent researches have proved in a great number of cases of sterility (according to *Sinéty*, in 50 per cent.) that the fault lies with the husband, who often, while keeping his virile power as far as regards congress, has no idea that he suffers from sterility. Thus, impotentia coeundi must be distinctly separated from impotentia generandi, inasmuch as the former *may* cause sterility (and, as a matter of fact, does in the majority of cases), but *must* not. We cannot admit from our own experience that even reduced power only in "very exceptional cases" (*P. Müller*), or "never" (*Gyurkovechky*), has produced the existence of a human being—and the latter in the most important cases having nothing in common with the attributes of the impotentia coeundi.

We distinguish two factors in impotentia generandi. Either there is no emission of semen, which constitutes *aspermatism*, or the emitted fluid is not capable of fecundation for want of spermatozoa—*azoospermia*. Neither the one nor the other excludes complete coitus.

The emitted fluid, semen, is composed at least of three secretions—that of the testes, of the seminal vesicles, and of the prostate. Regarding the *functions* of the prostatic fluid, we have

proved that it serves to arouse the vitality of the spermatozoa which fill the seminal filaments, but is incapable of reanimating them when they already show signs of death. This explains the fact that in fluid proceeding exclusively from the seminal vesicles, emitted during defecation, spermatozoa are motionless or are very sluggish, while in the secretion of pollution spermatozoa of the same patients may be present in a most active condition.

Aspermatism.

Etiology.—Aspermatism in the strict sense of the word—*i.e.*, in the condition in which the glands (testes, vesiculæ seminales, prostate) sharing in the formation of the fluid are not capable of acting in an absolute manner—probably does not exist. It is rather a case of defective emission of semen.

Aspermatism is not frequent—at any rate, as a cause of sterility. It is much more rarely met with than azoospermia.

We, like *Schulz*, distinguish a *permanent* (aspermatismus absolutus) and a *temporary* form (aspermatismus relativus).

In the former case the fluid cannot be ejaculated externally, because the orifices of the *ductus ejaculatorii* are either totally or partially obstructed, towards their *peripheric extremities* (from the side of the urethra, and in these cases the sperma penetrates into the bladder, and is expelled with the urine), or as a consequence of the existence of *mechanical obstruction to emission situated in the urethra*, an obstacle permitting of the flow of urine, but preventing that of the semen during erection. In these cases, as *Lapeyronie*, *Curschmann* and others have proved, the semen is emitted through the urethra after "internal" ejaculation, a fact perceived by the patients when erection begins to decrease. In cases where increase of the stenosis by erection appears insufficient to explain aspermatism, we conclude that the flow of urine is produced by the stronger *vis à tergo;* the thicker consistency of the spermatic fluid cannot be considered as an impediment.

As causes of "organic aspermatism" belonging to the first group the following may be considered: *Cicatricial closing up* and *deviation* of the ductus ejaculatorii arising from injury, operations (principally, according to *Toevan*, that of lateral lithotomy), inflammations. Then follow *affections of the prostate*, such as atrophy, tumours, contraction, consecutive to suppurating prostatitis (*Ultzmann* and others). The causes in the second category are constituted in the first place by gonorrhœal stricture and very marked phimosis (*Amussat*). In a case observed by us several years ago, the exploratory sound passed without meeting with obstacles, but endoscopic examination (*Nitze*) proved a fungoid shape of the veru montanum, produced by the infundibuliform orifice of the utriculus. This latter was probably distended by scarring arising from an ulcerating process due to

posterior urethritis developed in early childhood, as the existence of a retracted testis seemed to show. This patient, a giant in health and strength, later on suffered from epididymitis following gonorrhœa of the other testis, and became—probably a unique case—also azoospermatic.

As in impotence, all these forms may be of *congenital* origin. In these cases there is never ejaculation while awake, but during the night, when the patient is sleeping, very abundant nocturnal pollutions, accompanied with specific voluptuous sensations, take place (*Schulz*, *Hiquet*). These cases, met with in healthy individuals with normal genital organs, are of unknown origin. *Peyer* has recently described a very peculiar case of "apparently absolute congenital aspermatism, developing into relative aspermatism under the influence of local treatment." A thin, anæmic, neurasthenic patient, who had never had pollutions nor emissions, and had completely retained his virile power, frequently had semen in his urine. Under the influence of "astringent" treatment of the posterior part of the urethra, pollutions and ejaculations had commenced immediately after falling asleep. Unfortunately, nothing was said about the state of the urethra. These cases are explained by admitting that disturbances exist in the region of the centripetal nerves (*Cursch-mann*).

The *temporary* or *relative* form of aspermatism, which offers some points of resemblance to psychical impotence, is considered by *Güterbock* as a *psychical* aspermatism, in contradistinction to *organic* or *atonic* aspermatisms. In such cases, when mechanical obstacles to emission do not exist, ejaculation depends on the individuality of the patient, and on his more or less strong passion for this or that woman. The inhibiting influence of the brain must also be taken into consideration (the absence of the impulse proceeding from the centre), or, at any rate, the peculiar condition of the nervous centres which control emission. Individuals of this class are either perfectly healthy, or they are masturbators or persons of dissolute character. A certain number of these patients appear to be influenced by psychopathic antecedents. It is still impossible to draw the line between these conditions and nervous impotence.

It is possible that the function of the sphincter prostaticus plays a certain part in aspermatism. *Anderson* observed a case of prostatitis in which the semen penetrated after coition into the bladder, although stricture of the urethra did not exist. The inflammatory process once ended, the semen was again emitted externally, probably because the sphincter had recovered its tone, while paralysis, developed under the influence of prostatitis, allowed the semen to flow in the direction of the bladder, where there was less resistance.

We must not omit to mention a valuable observation made by

Bernhardt. In this case, under the influence of a traumatic lesion of the ano-vesical centre (commotio spinalis) semen was no longer emitted during coitus. Some time after the termination of the act itself, semen flowed slowly through the urethra. Probably in this case a paralysis of the bulbo-cavernous muscle existed, which plays an important part in emission, also paralysis of the vesiculæ seminales. As we have already remarked, this case explains the extraordinary course of the nerves which control erection and seminal emission.

PROGNOSIS AND TREATMENT.—The *prognosis* and *treatment* of aspermatism depend on the nature of the chief affection. Great are the results obtained in the forms due to phimosis and from stricture of the urethra, when one has succeeded in overcoming these conditions, as *Curschmann's* cases prove. *P. Müller's* advice to let the penis remain a long time in the vagina, so as to obtain even an incomplete passage of semen, is worth following. But in general it is still impossible to combat organic aspermatism successfully. During life the endoscope allows, in exceptional cases, an idea of the kind of deviation of the ductus ejaculatorii to be arrived at; but even when the diagnosis is made, we are not in a position to interfere locally in a rational manner. *Ultzmann* believes that faradization of the testes increases the secretions, and "that the *vis à tergo* is capable of breaking down the adhesions and the outlets to the ejaculatory ducts." This hypothesis appears to us doubtful. Local treatment of the posterior part of the urethra, directed against temporary aspermatism, is successful in obscure and exceptional cases, but has not the remotest influence on the affection in the majority of cases. We prefer in these cases the treatment recommended for impotence of psychical origin. Paralysis of the prostatic portion of the urethra should be treated by application of the electric current. Congenital forms resist all treatment.

AZOOSPERMIA.

In the majority of cases of azoospermia coitus and emission remain normal, but the fluid passed contains no fecundating elements nor spermatozoa.

Azoospermia is by no means a *rare* affection. *Busch*, in submitting 100 cadavers, taken as they came, to a methodical examination, observed the absence of spermatozoa in twenty-seven cases, and oligozoospermia in thirty-nine. This result, which agrees with our own observations on the subject, is all the more remarkable as the age of the individuals varied from sixteen to seventy-four, and that, according to facts stated by *Schlemmer*, *Casper*, *Dieu*, and *Duplay*, the limits of the physiological production of the semen are from sixteen to eighty-four years. Nevertheless, these researches are not quite conclusive, for a number

of the autopsies were made on persons who had succumbed to cachexia. In no less than eight cases of men who had died suddenly under sixty-eight years of age *Schlemmer* found fecundating elements wanting.

ETIOLOGY.—The causes of azoospermia are numerous. It may be the result of *functional inactivity* of the *testes*, or of an *obstruction in the conducting centres*, which usually follows abolition of the functional activity of the testes in a relatively short space of time. In the former the following causes may be incriminated: *General debilitating diseases* (alcoholism), usually very excessive and of a peculiar character, then lesions of the *centres* which control the elaboration of semen, *absence* or *morbid affections of the testes* and of the *adjacent organs* (disturbances produced by injury and neoplasm, especially cancer, tubercle, syphilis, malformations, rudimentary developments, atrophy after inflammation, atrophy through the pressure exercised by adjacent tumours, etc.). The closest connection exists with the etiology of impotence, already described, and the latter is usually not found wanting as a final consequence of these forms. Some authorities do not admit the term "azoospermia" for this reason.

Azoospermia resulting from *obliteration of the seminal centres* is much more interesting; it usually occurs on the other side of the opening of the vesiculæ seminales. This form, which may be considered as an azoospermia in the strictest sense of the term, was studied for the first time by *Gosselin*. In the majority of cases it is associated with contraction and obstruction of the epididymic lumen, with atresia and stenosis of the spermatic duct in consequence of *gonorrhœal epididymitis* or *double funiculitis*. *Liègeois* has diagnosed azoospermia in seventy-five out of eighty-three cases of double gonorrhœal epididymitis, and *Kehrer's* methodical observations leave no doubt as to the frequency of these forms. The latter observer published the history of forty sterile marriages, taken seriatim as they occurred, in which he had made microsopic examinations of the semen. In fourteen cases he found complete azoospermia. Of these fourteen individuals eight had had gonorrhœa, which in many of them was complicated by double epididymitis. It has often been decided that epididymitis is always unilateral. Therefore, in 35 per cent. of these cases sterility must be imputed to the husband. It is proved by *Kehrer's* observations that azoospermia exists in cases in which neither the *history*, nor the appearances of the *genital organs*, nor the *macroscopic* examination of the semen, would have led one to expect it, and where congress is effected *without difficulty* and *with a plentiful emission*. Our personal experience, which extends over many hundreds of cases, confirms *Kehrer's* views to a certain extent. But we cannot agree with him on some points. The practical importance of this subject, only so recently studied, forces us to enter into some detail.

With the exception of one case, we have always observed *absolute* and *permanent* azoospermia. The temporary azoospermia of which *Casper* speaks has been experimentally proved on animals by *Plönnies*, and is due to greatly exaggerated venereal excesses. We have several times had occasion to examine semen after distinct venereal excesses, and we have always found spermatozoa, and, like *Gyurkovechky*, who has made numerous researches on this subject, we consider the opinion of former authors on the frequency of physiological temporary azoospermia resulting from excess as unfounded. Nevertheless, cases exist in which, with no affection of the genital organs, the ejaculated fluid does not contain spermatozoa (*Hirtz's* "idiopathic sterility"). According to *P. Müller's* opinion, this absolute congenital azoospermia contradicts the generally admitted opinion, according to which the formation of semen in the testes is supposed to awake sexual desires, and the centres of erection to be identical with those of the formation of semen.

From an etiological point of view, an obstruction of the seminal course consecutive to epididymitis or funiculitis gonorrhoica duplex has been found in nearly every case. In our opinion, double gonorrhœal epididymitis or funiculitis will probably in nine cases out of ten lead to azoospermia. *Zeissl* considers this complication of gonorrhœa as insignificant—a theory we, like *Nöggerath*, cannot understand. We have never observed azoospermia as a result of simple spermatorrhœa, as *Lallemand* declares he has.

Among all the men we have examined, not one had an idea that he was sterile, except in those cases where the semen had already been examined by another physician. They nearly all accused their wives. Apart from remains of former epididymitis, we have found the genital organs normal, the testes frequently very large. In some cases these remains of epididymitis were noticeable on one side only, while, according to the history, funiculitis was said to have existed on the other side. In other cases we observed nothing abnormal, and the history did not allow of a double inflammatory process being diagnosed. Coitus did not cause the slightest difficulty, emissions were abundant, impotence seldom apparent.

These patients usually accept the diagnosis very unwillingly. One of our patients, who knew himself to have very great sexual capacity, was so furious at our supposition that he threatened us with legal proceedings. As a matter of fact, azoospermatic semen cannot be distinguished from normal semen by the naked eye alone.

It sometimes happens that the wife is incriminated, and taken from one physician to another, and from one clinic to another. The vulvar orifice is incised, etc., massage according to *Thure-Brandt's* method is employed, while a simple microscopic examina-

tion of the husband's semen would have proved that the wife was sterile because the husband had no spermatozoa. These ridiculous, and at the same time very serious, cases are fortunately becoming rarer. Many experienced gynæcologists commence with an examination of the husband, and refuse to look at the wife before examining the husband's semen. The idea of attributing sterility to azoospermia is gradually taking root, especially in large towns. We have recently observed some cases where both parties were sterile; in such cases separation is naturally useless. In another case observed by us, after the husband had for a long time accused his wife of sterility, he finally confessed to having had gonorrhœa, and that that was the cause of the sterility. We found his semen was capable of fecundation, sent his wife to another specialist, who diagnosed an obstruction to conception. Certain cases are complete enigmas to those unaware of these facts. The first marriage is childless, the first husband a perfect Hercules, a picture of health and strength; they divorce, and the wife marries a man suffering from phthisis, from whom she has a child every year. These facts are explained by azoospermia, but there are, nevertheless, many cases where the husband does not suffer from azoospermia, where the wife is healthy, and yet the marriage remains childless.

Azoospermia is of special importance from a legal point of view in divorce cases. "Apart from the moral side of the question, if one admits from a practical, human and legal point of view that the object of marriage is the procreation of children, decided proof of the absence of spermatozoa justifies legal separation" (*Kehrer*).

Regarding the macroscopic character of the semen in azoospermia, most authors allow that it presents the same consistency as normal semen, that it is not so viscid, but has the characteristic odour. *Lallemand* observed this in a case with bilateral orchitis. There is, however, nothing surprising in this, or in the presence of *Böttcher's* crystals, for one knows that the characteristic odour and the crystals are due to the prostatic fluid. It is hardly necessary to add that the fact of the emitted secretion not being so viscid is a consequence of want of testicular secretion. Nevertheless in some cases catarrhal secretions give a very turbid aspect to the secretion. Sometimes recently emitted semen was viscid and of a milky, starch-like aspect, but after a quarter of an hour it became fluid. In some cases gelatinous products of the seminal vesicles are found in the fluid, but blood rarely. In two cases the seminal fluid was composed solely of prostatic secretion in small quantity, and in this case the parts of the ducts situated peripherally from the orifice of the seminal vesicles were doubtless blocked. The absence of spermatozoa not being ascertainable by the aspect or by the odour, it is necessary to examine the fluid microscopically. In such cases *Böttcher's* crystals are found, as

also prostatic granulations and some cells, when catarrh is not at the same time present.

We will not conclude this section without a word of warning: sometimes persons really suffering from azoospermia, after having successfully deceived the physician, ask for a certificate that they are capable of procreating. In a case of the kind we suspected that the patient did not give us his own semen to examine. We are of the opinion that when the slightest doubt exists the certificate should only be given as regards the semen brought for the purpose of examination.

PATHOGENESIS.—The attempt has been made to ascertain the pathogenesis of azoospermia by experimental means. *Kehrer's* observations are especially worthy of mention. After *ligature of the vas deferens*, he observed a dilatation and a considerable hypertrophy of the walls of the peripheral portion of the spermatic duct and the cauda of the epididymis; the latter was filled with thick semen, containing contracted, incompletely developed spermatozoa. The testes continued these functions for five to nine months. While *Curling* considers atrophy of the testicle as the result of inflammation caused by accumulation of semen, *Kehrer* considers it to be caused by a condition resembling the atrophy of muscular disuse. *Brissaud* has observed that the reaction resulting from the ligature had a different effect, according as to whether the animals were separated from the females or not. In the first case, the spermatozoa retained their normal characters in the testes and epididymes, and the ulterior secretion ceased. In the second case, dilatation of the lumen of the epididymis, various cellular metamorphoses, and interstitial changes resulted, the formation of semen was accelerated and increased, and, finally, the testis had the same aspect as in an animal on heat.

Obolenski has succeeded in causing atrophy of the testes by section of the splanchnic nerve, a fact worth noticing, as it proves that traumatic lesions or surgical wounds may be of considerable importance.

Autopsies have frequently been made on men. They confirm the facts proved by *Kehrer*. Thus, *Gosselin* and *Curschmann* describe, in azoospermia resulting from gonorrhœa, dilatation of the vas deferens with thickening of the walls and stasis of the semen, rich in débris and containing, as well as degenerated cells, spermatozoa, partly normal, and partly undergoing degeneration. The testes in these cases were pale, flaccid, atrophied. According to *Busch*, azoospermia, from want of functional activity of the testes, is most frequently produced by fatty degeneration of the seminiferous tubules (especially in alcoholics), and by induration of the connective tissue (cirrhosis).

Most authorities admit that those suffering from azoospermia have small soft testicles. Our personal observations have con-

vinced us that in the majority of cases the testes are normal, sometimes even fairly large, and with the exception of remarkable cases of serious preceding local illness we have only met with genuine atrophy in cases when the patient was old and the illness of long duration.

DIAGNOSIS.—The *diagnosis* rests on the description of the affection which we have just given. It ought never to be attempted without the microscope.*

Some of our colleagues have put the question to us: "In what manner can one ask the patient for some of his seminal fluid?" Delicate as this question is, we have usually found that when we have made it clear to the patient that the seminal fluid is necessary—and if possible fresh semen—he asks for no other explanation, but usually brings us a sample in the course of a few hours. In these cases we do not trouble as to how the semen is obtained. If the patient asks for explanations, we recommend coitus with use of a condom. We do not approve of the proceeding of certain gynæcologists who take the fluid out of the female vagina after congress, a proceeding which disgusts us, and which we do not consider without danger, for reasons to be found in *P. Müller's* "Unfruchtbarkeit der Ehe." The situation may become painful if the husband is not capable of accomplishing his conjugal duties. In such cases the patient does not hesitate to refer to the "sins of his youth." We cannot feel ourselves justified in positively and decidedly recommending this method, although it is the best for immediate examination and for safe diagnosis.

In all cases prudery is out of place. Products of pollutions are not of much use for this examination. Microscopical examination of dry marks of semen is of no value as an aid to discovering the vitality or the number of the spermatozoa.

PROGNOSIS.—The prognosis of all these forms depends on the primary affection. One can only hope to see spermatozoa reappear in cases where abolition of the testicular function results from morbid conditions capable of being cured. The prognosis is especially bad in double gonorrhœal epididymitis and funiculitis. Out of eighty-three cases, *Liègeois* only saw spermatozoa reappear in eight. Our own carefully registered personal results lead us to believe that the prognosis in these cases is almost hopeless, especially when the azoospermia has lasted three months, or when it has been diagnosed three months after epididymitis. One has not, it is true, often the opportunity of examining cases of recent inflammation, for the patient attacked by epididymitis does not consider the condition his potentia generandi will be in later on. Other reasons drive him to the physician.

* *Fürbringer, op. cit.*: "In most cases one glance through the microscope reveals more than all medical sagacity, and decides at once the fate of married life."—W. H. G.

Neither our own observations nor those of others have altered our opinion on this subject.

TREATMENT.—With the exception of psychical treatment, which is of great importance, regular treatment does not exist. Only specific treatment in syphilitic affections of the testis succeeds admirably. Rational treatment of epididymitis is only of prophylactic value. Absorbent ointments, electricity, albuminous nourishment have been prescribed as capable of forming spermatozoa. Cases cured by this treatment would certainly have been cured spontaneously. We have often observed the shameless behaviour of specialists in such cases. They console the patient, and prolong the treatment for months, assuring him that the spermatozoa are commencing to reappear, whereas the microscopical examination made by us later proves the utter falseness of these assertions. The wife's conception is no certain proof of cure. We have several times met with cases where, in spite of the wife being pregnant, the azoospermia continued for months, and even years. In such cases a *friend* must have played an important part.

The whole value of the treatment lies in a correct diagnosis. It is always a thankless task to have to inform such a patient of his condition; but it must be done, and we warn against raising hopes which can never be realized. The manner of receiving this news is various. Some patients simply do not believe it, and consult another physician, who sometimes reassures them for a short time. Other patients remain perfectly cool, and show no sign of excitement. These are generally individuals who have had gonorrhœa, who have often taken their wives to gynæcologists, who discovered nothing. Thus they were somewhat prepared for the news. We have even observed genuine pleasure in some patients that they would never become fathers of a family. One young man begged us to certify azoospermia, in order to be indemnified from a lawsuit which threatened him. Human nature shows itself in such cases in queer ways. Finally, one meets with despair and suicidal ideas. We have seen very sad scenes, both in our consulting-room, and in the patient's house. Two points usually torment the patients who have still some feeling of honour: the idea that their family has died out, and that they have deceived an innocent woman. The situation becomes complicated when the wife insists on having children, and is examined by various gynæcologists. Divorce is then frequent. We recommend husbands to be very careful how they break the news to their wives. We have seen unexpected separation take place after the husband had owned the fact. We have sometimes advised adoption of a child, and this advice had good results.

The inefficacy of ordinary treatment has led us to consider if, in early cases, an operation would not be indicated—for example,

the excision of a part of the obstructed spermatic cord. In one case such an operation was contemplated, but, in consideration of the absence of spermatozoa in the epididymis, not carried into execution. Recent experiences as to the success of the operation on animals by introducing horse hairs into the lumen of the vas deferens are in opposition to the former opinion that the incision alone *must* lead to a new obstruction of the narrow aperture.

Under the heading "Sterility in the Male" must still be mentioned those cases in which the seminal fluid contains spermatozoa, but only in limited numbers ("oligozoospermia"), or with diminished vitality. *Sinéty* has devoted special study to these forms. It is evident that these cases are very difficult to judge, even if one can examine the semen directly after emission. We are still far from knowing the number of spermatozoa, the vitality necessary for fecundation, although rapid movements are a sign of the latter. These forms may be considered as precursory conditions of temporary or permanent azoospermia, perhaps also as proofs of improvement in the latter. We have recently had the opportunity of observing a large number of cases of oligozoospermia. We warn against a decided prognosis one way or the other, and from drawing conclusions of *modifications of form* from spermatozoa taken from the vagina of a woman. Even when manifest changes in seminal filaments in freshly emitted semen exist, it is very difficult to give an opinion as to the significance of these alterations from the point of view of sterility. We have, nevertheless, met with strongly refringent agglomerated masses bearing a striking resemblance to the rounded heads of spermatozoa in individuals who have neither had gonorrhœa nor epididymitis. Our ulterior examinations have never permitted us to distinguish in these masses organs resembling the flagella of spermatozoa. Even admitting that one has in these cases to do with malformed or abortive spermatozoa, the azoospermia remains, from a practical point of view, permanent and absolute. Furthermore, since *Lallemand* has published his really fantastical works on this subject, the matter ought to be taken up anew; up to the present time it has only been possible to make mere suppositions (*P. Müller*). On the other hand, one must not forget what has been said of the part played by the prostatic fluid, and be cautious in diagnosing from the immobility of the spermatozoa in the spermatorrhœal product inadequate or absent power of fecundation in the secretion. As we mentioned some years ago, we have observed in cases of isolated effusions of vesicula seminalis, which contained inert and rigid elements, emissions which showed under the microscope decided capacity for fecundation.

Finally, it is clear that also azoospermic individuals may in certain cases be attacked by loss of semen. Such losses are principally composed of prostatic fluid, and of secretions of the

seminal vesicles, or a condition of "*azoospermatorrhœa*." We have recently had the opportunity of observing several such cases, and, as formerly, found in the emissions gelatinous formations, resembling swollen grains of sago, proceeding from the seminal vesicles. Without this symptom a positive differentiation from *prostatorrhœa*, especially with catarrhal complication, is scarcely possible.

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